Solartron
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744

Locator 7201
Field logic tester
Maintenance Manual

MP MASTER
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SOLARTRON
Schlumberger

Locator 1201
Field logic tester

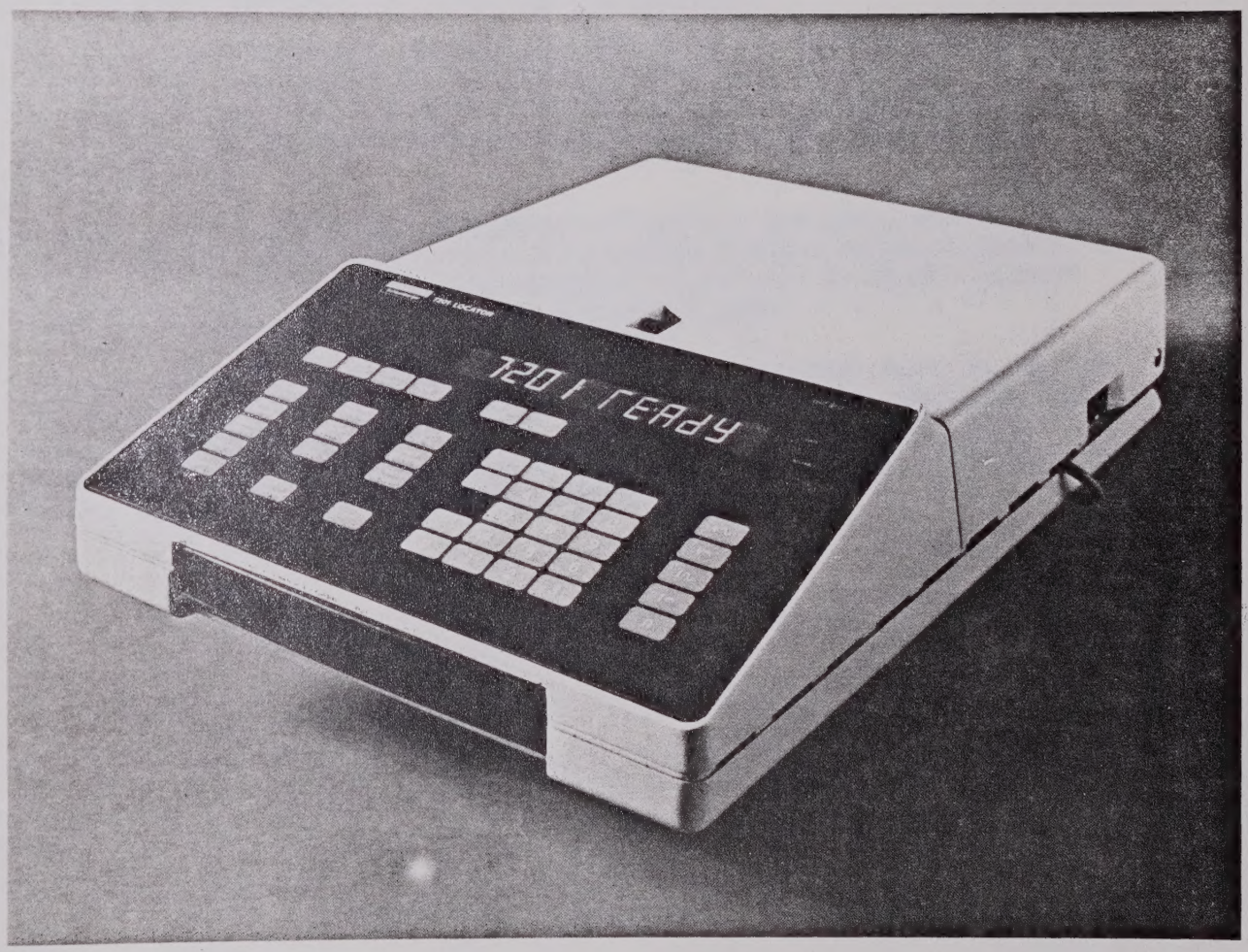
MAINTENANCE MANUAL

SOLARTRON

Part No. 12010011

Issue 2, Sept 19

Locator 7201
Field logic tester



Part No. 72010011

Issue 2, Sept 1981

SOLARTRON
Schlumberger

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MAINTENANCE MANUAL

SAFETY

This instrument has been designed and tested in accordance with the recommendations of IEC348, Class 1. The manual contains information and warnings which the user should follow to ensure his own safety and the continued safe operation of the instrument.

Attention has been given to making the 7201 Locator immune to most inadvertent overloads, and the voltage limits of 500V ac and 1kV dc mean that no damage will be caused to the instrument at this level of input. It must be appreciated, however, that even the most sophisticated measuring instrument can be dangerous when connected to high voltage, unless elementary safety precautions are observed.

Other than the displayed reading, no indication is given to the user that a voltage of that magnitude is present at the input terminals. Care must therefore be exercised whenever the DMM input leads are being connected to or removed from live circuits, or when probing near high voltage terminals.

Whenever it is likely that the safety of Locator has been impaired, e.g. if it fails to perform correctly, if it shows visible signs of damage, or if the specifications have been exceeded in any way, it should be made inoperative and returned to a suitable repair depot.

Any adjustment, maintenance or repair of this instrument must be carried out only by a skilled person who is aware of the hazards associated with ac power-operated equipment. Such adjustment, maintenance or repair shall be carried out in accordance with the procedures, and observing the precautions, detailed in Chapter 2 of this Manual.

Solartron's new multi-function instrument for fault diagnosis has also been designed and engineered for ease of maintenance. All of Locator's circuits have been designed for automatic testing facilities, i.e. the Power-up and Self-Test modes. Almost all of the tests necessary for diagnosing malfunctions, whether of the instrument or its accessories can be accomplished using another Locator. Compatability with most GP-IB controllers is available to Locator via the IEEE Interface.

There is no necessity for a regular re-calibration period. However, should a repair take place which requires component replacement, Locator may be found to be functioning below its minimum frequency, and re-calibration will be necessary.

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INTRODUCTION

This manual is written to enable fault finding down to component level to be carried out by repair organisations. A detailed treatment of the principles of operation is not given as these are to be found in the 7201 Locator Operating Manual. Signature analysis is the technique used for testing synchronous logic circuits, but Locator is used in other modes to check non-synchronous logic circuitry.

SUMMARY OF CONTENTS

Chapter 1 considers the two facilities of fault diagnosis within Locator, the Automatic Power-up checks, and the user-selectable, Self Test facility. Defects are high-lighted by one or other of these tests. In many cases the information given can show the extent of the defect and the user can continue to use the unaffected functions of the instrument. Included in this Chapter are Fault Diagnostic charts, which, with their function-ordered fault diagnosis, analyse the various FAIL messages and make recommendations for exploratory and remedial action. References are made to the characterisation tables which are in Chapter 2 of the Manual.

Chapter 2 contains the characterisation tables and circuit diagrams which are pertinent to models of Locator which have no Mod. Strike label (Issue 1) and also those which are modified to Mod. Strike Al state (Issue 2).

Chapter 3 gives details on how to check the performance figures of the PCB1, DMM and Power Supply sections of Locator, which may be necessary when repair has involved component replacement. Also given in this section are details of performance checks and calibration adjustments which may be necessary following a repair. The logic and counter-timer functions are checked by the Self Test function.

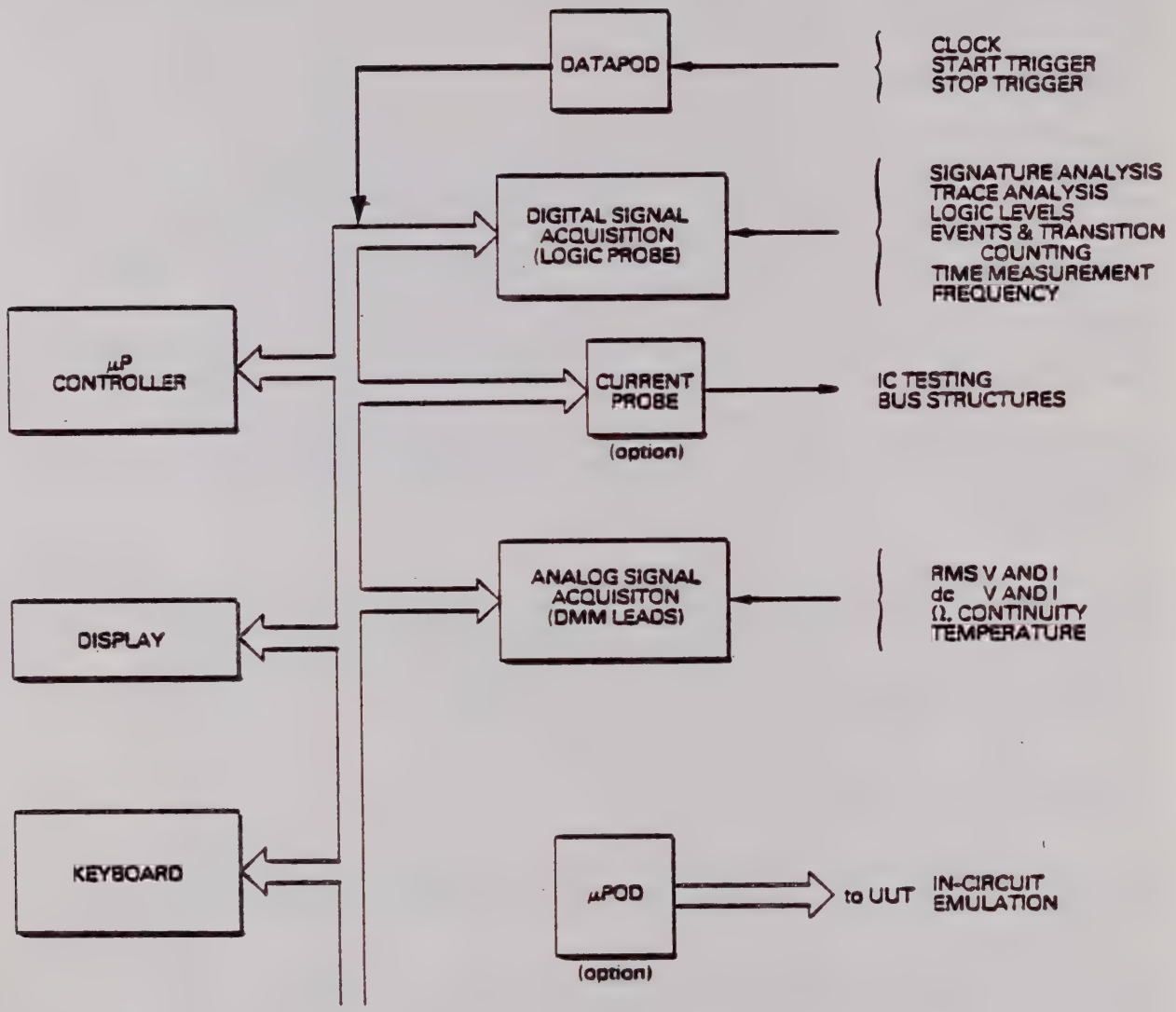
Chapter 4 contains the full technical specification figures for Locator's performance.

Chapter 5 contains the pcb notation diagrams and the pcb parts lists relative to the circuit diagrams in chapter 2, which are modified to Mod. Strike Al state.

Appendix 1 gives details of Special Test Equipment including circuit diagrams and parts lists where applicable.

ASSOCIATED PUBLICATIONS

A separate publication, Locator Application Notes will be supplied on request to all Locator owners, as will Application Supplements as they are published. A users handbook is shipped with each instrument; additional copies may be obtained from Solartron.



Block schematic diagram of Locator 7201 Field Logic Tester

CHAPTER 1

FAULT DIAGNOSIS

FAULT DIAGNOSIS

1 DESCRIPTION OF INTERNAL CHECKS

1.1 Automatic Power Up Check

These tests occur immediately Locator is switched-on. The tests are numbered 0 through 5 and are performed sequentially. If all the tests are completed satisfactorily, then 7201 rEAdY is shown in the display. Should any of the tests fail, the sequence stops immediately and a fail-message, FAIL n, is displayed, where n is the test number. Until the fault is cleared, Locator must not be used for servicing, although a fail-message at this stage does not signify that Locator is totally unusable.

Fail code messages are:

FAIL 0	Error in Checksum
FAIL 1	(ROM)
FAIL 2	Failure in µP
FAIL 3	internal RAM
FAIL 4	Failure in external
FAIL 5	RAM

In test 4 and 5, the specific IC which has failed is identified by a letter which follows the fail-message number:

L	=	Low Byte	= IC78
H	=	High Byte	= IC81
E	=	Both IC's failed	

Should a failure occur in the test sequence, then it is possible to force Locator through the failed test by operating the KEY DATA button once.

1.2 Self Test Checks

SELF TEST investigates Locator functions. It checks Signature and Trace Analysis at 2MHz, Counting Functions at 50kHz, and Gating Functions (Start and Stop) at 50Hz. For checks at faster speeds refer to Digital System checks on page 3.3. It is sufficient to detect the majority of defects within the instrument and its accessories. Self Test does not check the Micropod which is functionally and physically separate from Locator. Before engaging Self Test, the input connections of Datapod 1 (which is situated on the right-hand side of Locator), must be connected to their respective test pins on the side of Datapod 1, i.e.

Green connector to the START test pin.
Red connector to the STOP test pin.
Yellow connector to the CLOCK test pin.

The input connector of the Logic Probe must be connected to the PROBE test pin of Datapod 1, via the Dataclip lead. The Black connector does not need to be connected to a test terminal and can safely be left free. Datapod 2 is situated on the left hand side of Locator and should it be available, the green, red and yellow connectors must be connected as for Datapod 1. The PROBE test pin is not connected on Datapod 2.

To select Self Test the user must press the silk-screen 'SELF TEST' annotation on the front panel as though it were a key outline.

Having pressed the SELF TEST annotation, a lamp test, which shows the correct working of each segment of the display is shown for 1 second. Once selected, this feature causes Locator to run on an approximate 7 second cycle, which on satisfactory completion causes a PASS message to be displayed for 5 seconds before the cycle is repeated. If Locator is equipped with one Datapod, the pass message "PASS 01" is displayed. If both Datapods are connected, the pass message is "PASS 02". If a fault is detected the sequence is halted and a coded FAIL message, FAIL n is displayed, where n is the function test number. Note the message from Table 1.

Note that the sequence, having stopped at the first failure, cannot be restarted to complete the test automatically. Hence at this stage the engineer can only be confident that the preceding functions are good, and he has no knowledge of the condition of the instrument beyond that point.

TABLE 1

TEST No.	FUNCTION TESTED	POLARITY REQUIREMENT: START TRIGGER	POLARITY REQUIREMENT: STOP TRIGGER	POLARITY REQUIREMENT: CLOCK (QUALIFIER)	GOOD DATA	POSSIBLE "FIRST LINE" REASON FOR FAILURE
11	FREQUENCY	NOT APPLICABLE			50000	Logic Probe input disconnected
12	PERIOD/WIDTH	↓	↓	NONE	19.9 to 20.1	
13	PERIOD/WIDTH	↑	↑	NONE	9.9 to 10.1	
14	DELAY	↓	↑	NONE	9.8 to 10.0	Start trigger disconnected
15	DELAY	↑	↓	NONE	19.8 to 20.0	
16	COUNT EVENTS	↓	↓	NONE	300	Stop trigger disconnected
17	COUNT EVENTS	↓	↓	⊓	250	Clock disconnected
18	COUNT TRANS	↓	↓	NONE	2000	
19	COUNT TRANS	↓	↓	⊓	1500	
1A	COUNT TRANS	↓	↓	⊓	0	
1B	SIGNATURE (MODE 1)	↓	↓	↓	8UA4	
1C	LINE SIG (MODE 2)	↓	↓	↓	752F 8UA4	
1D	LINE SIG (MODE 2)	↑	↑	↑	7530 1U89	
1E	LINE SIG (MODE 1)	↓	↓	↑	752F 8UA4	
1F	LINE SIG (MODE 1)	↑	↑	↓	7FFF FC90	
90	LINE SIG (MODE 1)	↓	↑	↓	4E1F 76C3	
91	LINE SIG (MODE 1)	↑	↓	↑	270F 9CU0	
92	LINE DATA (MODE 1)	↓	↓	↓	-	
93	POD 2 SIGNATURE (MODE 2)	↓	↓	↓	0U87	
94	POD 2 SIGNATURE (MODE 2)	↑	↑	↑	87E3	
95	POD 2 SIGNATURE (MODE 1)	↓	↓	↑	4C91	
96	POD 2 SIGNATURE (MODE 1)	↑	↑	↓	0H60	
97	POD 2 SIGNATURE (MODE 1)	↓	↑	↓	5P54	Pod 2 bad connections
98	LOGIC LEVEL	NOT APPLICABLE			20 to 25	
99	A-to-D CONVERTER ZERO	NOT APPLICABLE				

2 SIGNATURE ANALYSIS

2.1 Introduction

Refer to the paragraph on Signature/Trace Analysis on page 1.2 of Locator Operating Manual.

In Locator, the data-streams are generated internally, and another Locator may be connected directly to a failed unit via its Datapod and Logic Probe.

2.2 Setting up for test

2.2.1 Remove the four screws in the well and the two screws under the front of Locator. Lift the top moulding cover vertically until clear of the power unit at the rear. Place the top cover to one side, leaving the two ribbon cables connecting the display to the front of the main logic board.

2.2.2 Unscrew the four corner screws and the centre hexagonal pillar of the small multimeter pcb (pcb 2) in the base moulding of Locator, and lift pcb 2 off.

2.2.3 Remove the screen underneath pcb 2 by sliding it to the right and lifting it up.
NOTE: PCB 2 must be left electrically connected by its ribbon cable it if is to be tested. However, disconnection does not affect Signature Analysis, although FAIL 99 will be displayed in the SELF TEST mode.

2.3 Selecting Signature Analysis Mode of Operation.

There are two characterisation test modes, FREE RUN and STIMULUS.

FREE RUN is used for checking the address and data bus of the microprocessor, and is used for identifying faults occurring in the power-up checks. To select Free Run,, set S2 gang 1 'ON', i.e. so that the red dot shows. All other gangs of S2 must be OFF, i.e. the red dots are hidden.

Connect the Data Pod of the testing Locator as follows:-

Data Pod	Test Point at front of PCB 1
START	S/S FREE
STOP	S/S FREE
CLOCK	CLOCK
GROUND	GND

Disconnect IEEE Interface (72012A) if fitted to PL6.

Select +ve START polarity, +ve STOP polarity and -ve CLOCK polarity.

Check the Vcc signature,, which should be 0003. This is the signature of the +5v supply.

If the signature reads '0001', this implies that there has been no Reset to the microprocessor. Turn off S2 gang 1 for at least 1 second and turn on again. Do not turn off the power supply. If the signature is still '0001', there is a fault on the reset circuit (See Section 9.2) or the microprocessor, IC75.

STIMULUS is used to exercise the input logic, the pods and the probe. It is used for finding faults after a Self Test failure. In Stimulus mode, a special program is executed which causes almost all nodes in the logic to change at different times, thus causing different signatures to appear on each node. Start, Stop and Clock signals are generated to synchronise the testing Locator. Circuits specific to Pod 2 and to the Logic level function are not exercised in Stimulus, so testing is done by a separate flow chart.

To select Stimulus mode, set S2 gang 2 ON. ALL other gangs must be OFF unless LK1 is missing, in which case set gang 4 ON.

Connect the Data Pod 1 and Logic Probe of the failed Locator as follows:-

Green	probe to Start pod test point
Red	probe to Stop pod test point
Yellow	probe to Clock pod test point
Logic Probe	probe to Probe pod test point

Disconnect the IEEE Interface 72012A if fitted to PL6.
Disconnect Pod 2 from PL3 on PCB 1.

Connect Data Pod 1 of testing Locator as follows:-

Data Pod	Test point at front of PCB 1
START	S/S STIM
STOP	S/S STIM
CLOCK	CLOCK
GROUND	GND

Check the Vcc signature (Probe on +5v). The correct signature is given in the characterisation tables, Chapter 2. If the signature is incorrect, refer to Section 11.

NOTE: The Logic Probe earth clip does not need to be used all the time. However, if an UNSTABLE signature is indicated, the earth clip should be connected to the ground pin of the nearest IC. It is most commonly needed for the outputs of 74S series Schottky TTL, where the signal slew rate is highest, but is also needed where critical timings occur on 74LS series TTL.

3. SYMPTOMS LIST

There are two classes of symptoms defined:

1. Self-diagnosis, e.g. Power-up test failure. These include No display, No keyboard etc.

2. User-diagnosing, e.g. Locator takes a known reading but displays an incorrect result.

If a User-diagnosed fault appears, for Multimeter faults (e.g. VDC, VAC, IDC, IAC, OHMS, TEMP), go to section 7. For other faults, run Self Test (see section 1.2). If Self Test is correct, the fault is probably speed related, e.g. Start/Stop set-up times are being infringed, or the Locator is outside its timing specification. Chapter 3 (Post-Repair Performance checks) explain how to check the speed performance of the Locator.

The relative timing of Start, Stop, Clock and Data signals generated by the Unit Under Test (UUT) are a matter of Unit Under Test Design.

For self-diagnosing faults, the table below shows which of the following sections should be used for fault diagnosis.

Symptom	Comments	Section
Display faults	Display blank	4.1
	Partial display	4.1
	Wrong display format	4.1
	Display flickers	4.2
	Individual LED failure	4.3
	"No Pod 1" or "No Pod 2"	4.4
Power-up check failure	Display blank	4.1
	Display shows "FAIL n" where n is 0 to 5	5.1
	Display cycles through "TEST 0" to "TEST 5".	5.2
	Display shows "FAIL n" where n is 6 to 8	5.3
Self Test Faults	Display shows "FAIL nn" where nn is 81 to 99	6.0
Multimeter	Display format	4.1
	Wrong reading	7.0
Keyboard		8.0
Intermittent	Display intermittently goes through TEST 0 to TEST 5 and shows 7201 rEAdy	9.0
Power Supply		10.0
STIMULUS test mode gives wrong Vcc signature		11.0
Miscellaneous	Defective Logic Probe LED	12.1
	No Bleep on Keypress	12.2

4 DISPLAY FAULTS

To gain access to the display board, remove the top cover moulding, as described in section 2.2. The display board and the keyboard are held by 5 screws inside the top cover moulding. Remove these and the keyboard may be lifted by the left hand side and unplugged from the right of the display board.

4.1 Display blank

Turn power off, then on again. If fault has cleared, the problem is probably due to RF1, excessive mains-borne interference or heat. Further tests are suggested in section 0 "Intermittent Resets".

If fault does not clear:-

4.1.1 Check fuses:
An indicationn of power present is available without removing the covers by connecting the Logic Probe to any Data Pod Test Point and checking that the Logic Probe Lamp flashes.

4.1.2 Remove covers:
Check Power Supply + 5v
If wrong, go to section 10
Check S3 is correct

4.1.3 Set up for STIMULUS mode test (see Section 2.3)
If Vcc signature is wrong, go to Section 11
Check IC101/8, Node X040
IC101/11, Node X039
Check Display Board Signatures,
IC301, IC302 Pins 5 to 14
Check +5v, 0V on Display Board

4.1.4 Set up FREE RUN test mode (see Section 2.3)
Check Bi-directional Data Bus signatures,
(see Chapter 2, Issue 2).

4.2 Display flickers

Check signature on IC100/9, Node Y005 (See Chapter 2, Issue 2).
If correct, go to section 4.1.

4.3 Individual LED failure

The LEDs are driven by IC301 and IC302 which have their own internal clock, multiplexing circuits and LED drives. If an LED fails, exchange it for a known good LED. LEDs plug into sockets except for the two annunciator lamps. This will show whether the LED or the driving IC is at fault.

4.4 Fail message 'no Pod 1' or 'no Pod 2'

When a function is selected that requires the use of Data Pod 1 or Data Pod 2, the program checks that the pod is available by reading the Data Pod sense line on pin 19 of PL4 (Pod 1) or pin 19 of PL3 (Pod 2)

Check that Data Pod is plugged in to PL4 or PL3 and that the sense line is low (0,8v) on IC58/8 (for Pod 1) and IC58/11 (for Pod 2).

If correct, check Data Bus signatures and IC58/1,19 (Node X029) in FREE RUN.

5 POWER-UP CHECK FAILURE

If any of the following symptoms occur on Power-up, refer to the section indicated.

Symptom	Section
Shows blank display on power-up	4.1
Fail n (n = 0 to 5)	5.1
Cycles through TEST 0 to TEST 5 repeatedly	5.2
FAIL n (n = 6 to 8)	5.3

5.1 Fail n(n = 0 to 5)

Symptom	Action
FAIL CODE 0	Select FREE RUN test mode (see Section 2.3) If correct, change IC72 and IC74 If incorrect trace fault back to faulty component
FAIL CODE 1	Repeat checks for 5.1 for IC71 and IC73
FAIL CODE 2 or 3	Change Microprocessor chip, IC75
FAIL CODE 4 or 5	This fail message always gives an extra code L, H or E, (see Section 1.1) For any FAIL message with an extra code, check IC78/8 and IC81/8 in FREE RUN test mode, node X014. Check that IC78/10 and IC81/10 are high in FREE RUN and pulsing during Power-up checks. Select STIMULUS Test mode (see Section 2.3). If Vcc signature is incorrect change IC78 and IC71 as detailed below. If Vcc is correct, check the R/W line signature (Nodes X068, X069, X070). Check continuity to IC78/10 and IC18/10 If checks are good, then for CODE L Change IC78 CODE H Change IC81 CODE E Change IC78 and IC81

5.2 TEST 0 to TEST 5 cycling

Symptom	Section
Test 0 to Test 5 repeatedly	Check S2 gang 3 is OFF and that IC90/10 is at Logic Hi. Set up STIMULUS Test Mode Check the Vcc signature. If it is incorrect go to section 11. If the Vcc signature is correct check the following nodes. IC90/9 Node X091 IC93/2 Node X039 IC94/8 Node X070 If these nodes are correct, go forward to the next node, etc. If the nodes are incorrect trace the fault back through the circuit. Perform the test specified in section 9.2. Switch OFF all gangs on S2. Check that IC82/2 has the following Period/Width settings: +ve START, +ve STOP, 20,000µs -ve START, +ve STOP, 2,500µs In STIMULUS Test Mode Check IC82/1 and IC82/19 (Node X013)
5.3 FAIL n (n = 6 to 8)	Unplug IEEE interface (72012A) from PL6. If it is not fitted then the FAIL code is unreliable, and all checks in 5.1 must be completed.

NOTE: FAIL codes 6 to 8 are covered in the IEEE Interface Technical Manual.

6 SELF TEST FAULTS

TABLE 2

TEST No.	FUNCTION TESTED	POLARITY REQUIREMENT: START TRIGGER	POLARITY REQUIREMENT: STOP TRIGGER	POLARITY REQUIREMENT: CLOCK (QUALIFIER)	GOOD DATA	POSSIBLE "FIRST LINE" REASON FOR FAILURE
81	FREQUENCY	NOT APPLICABLE			50000	Logic Probe input disconnected
82	PERIOD/WIDTH	⌐	⌐	NONE	19.9 to 20.1	
83	PERIOD/WIDTH	⌐	⌐	NONE	9.9 to 10.1	
84	DELAY	⌐	⌐	NONE	9.8 to 10.0	Start trigger disconnected
85	DELAY	⌐	⌐	NONE	19.8 to 20.0	
86	COUNT EVENTS	⌐	⌐	NONE	500	Stop trigger disconnected
87	COUNT EVENTS	⌐	⌐	⊟	250	Clock disconnected
88	COUNT TRANS	⌐	⌐	NONE	2000	
89	COUNT TRANS	⌐	⌐	⊟	1500	
8A	COUNT TRANS	⌐	⌐	⊟	0	
8B	SIGNATURE (MODE 1)	⌐	⌐	⌐	8UA4	
8C	LINE SIG (MODE 2)	⌐	⌐	⌐	752F 8UA4	
8D	LINE SIG (MODE 2)	⌐	⌐	⌐	7530 1U49	
8E	LINE SIG (MODE 1)	⌐	⌐	⌐	752F 8UA4	
8F	LINE SIG (MODE 1)	⌐	⌐	⌐	7FFF FC90	
90	LINE SIG (MODE 1)	⌐	⌐	⌐	4E1F 76C3	
91	LINE SIG (MODE 1)	⌐	⌐	⌐	270F 9CU0	
92	LINE DATA (MODE 1)	⌐	⌐	⌐	-	
93	POD 2 SIGNATURE (MODE 2)	⌐	⌐	⌐	0U87	
94	POD 2 SIGNATURE (MODE 2)	⌐	⌐	⌐	87F3	
95	POD 2 SIGNATURE (MODE 1)	⌐	⌐	⌐	4C91	
96	POD 2 SIGNATURE (MODE 1)	⌐	⌐	⌐	0H60	
97	POD 2 SIGNATURE (MODE 1)	⌐	⌐	⌐	5P54	Pod 2 bad connections
98	LOGIC LEVEL	NOT APPLICABLE			20 to 25	
99	A-to-D CONVERTER ZERO	NOT APPLICABLE				

When a SELF TEST fail code occurs, the user should check the first line diagnostics in column 7, and then select the failed function via the keyboard. Select the START, STOP and CLOCK polarities and observe the data and annunciator GATE lamp. If the UNSTABLE indicator is on, this indicates wrong data. Tests 91 and 92 perform extra checks on stored data. To check these, select the function and trigger polarities and then press HOLD on the logic probe key in the required Line Signature address (2 numbers) or Line Data address (3 numbers) and check the data given under the fail code in Table 3.

Table 3 lists the fail codes and provides a list of nodes to be tested by Signature Analysis in the STIMULUS mode. Start with the first node given. If the signature is incorrect trace the circuit back from inputs to driving outputs and from outputs to all the inputs of the same chip. If the signature is correct, check the next node given in Table 3.

TABLE 3

Fail Code	Symptom	Start SA at:-	Further Action
81	GATE lamp never on	IC28/12 (Node X182)	IC41.6 Node X164 Switch OFF S2, gang 2 and check that IC54/12 gives 400Hz frequency. Check GATE lamp can turn on by pressing SELF TEST. Cycle the power switch to get into keyboard mode. Switch ON S2 gang 2 before taking any more signatures.

Fail Code	Symptom	Start SA at:-	Further Action
81	GATE lamp stuck on	IC28/12 Node X182	IC48/6 (X166) Switch OFF S2 gang 2 Cycle power switch to get 7201 rEAdY Select COUNT EVENTS Check that frequency at IC 48/3 is 400Hz (with -ve STOP TRIGGER POLARITY) and 0Hz (with +ve STOP TRIGGER POLARITY)
	Wrong Data		Datapod Test Point (50kHz) IC17/5(X102 Internal Data Bus (ID0-15) IC98/3 (X083) Switch OFF S2 gang 2 Cycle power switch Select FREQUENCY frequency of IC105/3 is 5Hz. Switch on S2 gang 2 before taking any more signatures. Check IC40/1, 19 and IC47/1,19 (Nodes X070, X016, X017). Check the Bi-directionnal databus (BD0-7).
82	GATE light never on	IC28/12 X 182 IC41/6 X 164	
	GATE light never on	IC28/12 X 182 IC48/6 X 166	
	Data wrong	IC28/12 X 182 IC18/5 IB 05 IC 35/6 X 184	Switch OFF S2 gang 1 Check that frequency of IC 35/4 is 10MHz ± 200Hz Switch ON S2 gang 2

Fail Code	If GATE light never on, start S.A. at:	If Gate light stuck on, start S.A. at:	If Data wrong Start S.A. at:
83	IC28/12 X 182 IC41/6 X 164	IC2/6 X 167 IC28/12 X 182	IC2/6 X 167 IC28/12 X 182 IC35/6 X 184
84	IC41/2 X 136 IC41/6 X 164 IC28/2 X 182	IC48/6 X 166 IC28/12 X 182	IC28/12 X 182 IC35/6 X 184

Fail Code	If GATE light never on, start S.A. at:	If Gate light stuck on, start S.A. at:	If Data wrong Start S.A. at:
85	IC48/6 X 166 IC28/12 X 182	IC28/12 X 182 IC41/6 X 164	IC28/12 X 182 IC35/6 X 185
86	IC41/6 X 164 IC28/12 X 182 IC41/1 X 136	IC48/6 X 166 IC28/12 X 182 IC48/1 X 137	IC35/6 X 184 IC35/1 X 147 IC17/5 X 102 IC48/1 X 137
87	IC28/12 X 182 IC30/1 X 185 IC41/6 X 164	IC28/12 X 182 IC30/1 X 185 IC48/6 X 166	IC35/6 X 184 IC35/1 X 147 IC17/5 X 102 IC48/3 X 137 IC28/12 X 182
88	IC41/6 X 164 IC28/12 X 182 IC41/1 X 136	IC28/12 X 182 IC48/6 X 166 IC48/1 X 137	IC2/3 X 147 IC35/6 X 184 IC17/5 X 102 IC28/12 X 182 IC48/6 X 166
89	IC28/12 X 182 IC30/1 X 185 IC41/6 X 164	IC28/12 X 182 IC35/1 X 147 IC48/6 X 166	IC35/6 X 184 IC17/5 X 102 IC30/1 X 185 IC28/12 X 182
8A	IC30/1 X 185 IC28/12 X 182 IC41/6 X 164	IC30/1 X 185 IC28/12 X 182 IC48/6 X 166	IC30/1 X 185 IC28/12 X 182 IC35/6 X 184
8P	IC28/12 X 182 IC41/6 X 164	IC28/12 X 182 IC48/6 X 166	IC29/8* X 159 IC9/6* X 162 Internal Data Bus (ID0-15) IC40/1 X 070 IC47/1 X 070 IC40/19 X 016 IC47/19 X 017

* If IC9/6 is incorrect and IC29/8 is correct, the fault is in a feedback loop. Use Trace Analysis and Auto Compare with a known good unit, to check IC3, 4, 10 and 16.

Fail Code	If GATE light not flashing start S.A. at:	If Gate light stuck on, start S.A. at:	If Data wrong Start S.A. at:
8C,8D	IC28/12 X 182	XC9/11 X 189	IC29/8 X 159
8E,90	IC41/6 X 164	IC31/7 X 065	IC9/6* X 162
	IC48/6 X 166	IC31/9 X 253	IC28/12 X 182
		Outputs of IC33,39 (Nodes X071-078)	Internal Data Bus ID0-ID15
		IC26/1 X 035	IC40/1 X 070
		IC60.1 X 037	IC47/1 X 070
			IC40/19 X 016
			IC47/19 X 017

* If IC9/6 is incorrect and IC29/8 is correct, the fault is in a feedback loop. Use Trace Analysis and Auto Compare with a known good unit, to check IC3, 4, 10 and 16.

Fail Code	Action
91	Select function and TRIGGER POLARITIES as specified in Table 2. If GATE or DATA is incorrect perform checks as for Code 8C. If GATE and DATA are correct, the FAIL code has occurred because of the extra checks for this code only. Press HOLD button on Logic Probe to stop the measurement. Press Key "O" twice. Locator should respond with the display L 00FF 2POU Press key "STEP ↑". On each press the following data is displayed: L 01FF 881C L 02FF F80U L 03FF 5290 If there is an error, the RAM chips IC6 or IC19 are faulty, or the way in which they are written to, or read from is incorrect. Set up for STIMULUS Test Mode Check the signatures on IC6 and IC19 If there is no error, the fault is intermittent, (see Section 9)
92	Select Function and TRIGGER POLARITIES as specified in Table 2. Press keys "O", "C" and "O". The values will be displayed as they are entered. Check that the reading displayed is d 0C0F 00FF If the GATE lamp is not flashing, go to the Fail Code 92 check below. Press HOLD key on Logic Probe, to stop the measurement. Press key 'STEP ↑". On each press the following will be displayed: d 0C1F F000 d 0C2F FFFF d 0C3F 0000 d 0C4F FFF0 If data is wrong, there is a RAM fault. Set up for STIMULUS Test Mode and take signatures on IC6 and IC19.
92	No GATE lamp in Line Data. Select Line signature, with trigger polarities for TEST 92 in Table 2. If GATE lamp is faulty, reselect SELF TEST and check the symptom.

Fail Code	Action
92	If GATE lamp is good, use data for TEST 91 in Table 2. Select LINE DATA. If gate lamp is still not flashing, select STIMULUS Test Mode and check the signatures defined below. If signature is good go forward to next node. If signature is not good, trace the fault back through the circuit. IC28/12 Node X182 IC9/1 Node X126 IC49/4 Node X178
93,94 95,96 97	Interchange Datapods 1 and 2 and re-select SELF TEST. If the same FAIL code is received, proceed to next check on Fail Codes 93 to 97. If a new FAIL code occurs the fault is in Datapod. Service the new FAIL code. Connect the START, STOP and CLOCK inputs of Datapod 1 to the test points on Datapod 2, and the Logic Probe to Datapod 2 Probe test point. Check the signatures given in Table 2 for Fail Code 93-97. If incorrect the fault is in the Test signals on Pod 2. Check FREQUENCY by probing the Data Pod 2 test point as follows:- PROBE 50,000Hz START 50Hz STOP 50Hz CLOCK 100,000Hz Trace faulty signal back through the circuit. The receive circuitry of Pod 2 is not checked in STIMULUS test mode, but the control line is. Set up STIMULUS test mode. Check IC34/12 Node X134. Switch OFF S2 gang 2 and cycle the power switch to get back to normal. Check that the outputs of IC61 follow the Data Pod 2 test points outputs. Select SIGNATURE and press AUTO COMPARE. The display should show "PROBE REF". Refer to page 3.5 of Locator Operating Manual and selection of ZZ2 code. Check the following: IC61/5 is 50Hz (Datapod 2 START) IC61/12 is 50Hz (Datapod 2 STOP) IC61/4 is 100kHz (Datapod 2 CLOCK)

The outputs of IC61 are inverted for +ve selected TRIGGER POLARITIES and non-inverted for -ve selected TRIGGER POLARITIES.

Fail Code	Action

98 Select STIMULUS Test Mode and check the signatures at:

IC44/4,5	X140,X141
IC28/9	X237
IC21/9	X186
IC31/2	X124
IC31/3	X249
IC31/4	X189
IC31/7	X065
IC31/9	X253
IC31/14	X127
IC31/15	X252

Select LOGIC LEVEL on the 'Failed' instrument. Using a 'good' Locator check the Datapod test pod PRB on the 'failed' instrument for a displayed logic level of 20%-25%.

Check IC21/1 for
logic 0. Check IC21/2 for 50000 Fr. Check IC21/3 for logic level of 20% to 25%.

With the Logic probe of the 'failed' instrument o/c, check IC8/2 for logic 1, and IC8/6 for logic 0.

With the logic probe on 0V or +5V check IC8/2 for logic 0 and IC8/6 for logic 1. Check IC22/13 for logic 0 and IC22/12 for logic 1. Select any other function on the 'failed' Locator and check IC22/13 for logic 1 and IC22/12 for logic 0.

99 Remove cable between pcb 1 and pcb 2. Check SK8/3 for 33330 Fr c10. Link SK8/3 to SK8/11. Re-select SELF TEST.

If this test fails the fault lies in pcb 1.

Select $\overline{V---}$ on the 'failed' instrument. Using the 'good' Locator, trace 33kHz from SK8/3 to SK8/11, and thence to IC22/11.

7 MULTIMETER FAULTS

Check the V⎓ mode with a range of input voltages, and then refer to the following table. All measurements are made relative to floating 0V except where earth reference is used.

Symptom	Possible Fault	Action
Reading fixed at zero for all inputs	No floating supply	Check that there is +12V on the positive plate of IC218. Check that there is -12V on the negative plate of C220. Check that there is 5V on the negative plate of C222.
	No output from Opto-coupler IC212	Check that there is a nominal frequency of 26kHz ± 5kHz at 5Vpp on TP5 (earth reference).
	No output from the V-f convertor IC203.	Check that there is a frequency of 26kHz ±5kHz at 10Vpp on IC203/3.
	RLA or RLD open circuit, or not energised.	Check that the i/p voltage is on R203/1.
	IC211 not switching	Check that there is a d.c. voltage input IC211/12. and a 2Hz square wave o/p (of the same amplitude as the i/p d.c. level), on IC202/8.
Reads when input is changed but the reading decays to zero.	RLD not operating	Check the signal through RLD/3.4.
Reading fixed at overload, even for zero input.	Input amplifier may be faulty	Check voltages on IC201, and on protection network D210, D211 etc.
Reads overload of appropriate polarity.	Feedback o/c.	Check pins RLC/1,14
Fault not on every range	Relays and drives faulty	Check relays and drives on RLE, F, G, H.

Check the Ω mode with s/c, o/c and a range of resistor values. Refer to the following table for further checks.

Sympton	Possible Fault	Action
Reading zero reference on when o/c	1V reference on TP2	Check that the 1V TP2 TP2 is correct. Check that the 1V reference voltage is connected to R203/R206 via RLC.
Reads overload when s/c.	RLB faulty	Check RLB and drive circuit.
Faults on some ranges only		Check that relays E, F, G and H are operating correctly. If Vdc has ranged correctly, fault could be in IC207 decoder.

Check the $I\overline{---}$ mode with zero current and then with various current inputs as available.

Sympton	Possible Fault	Action
Reading zero on all ranges		Check FS201. Check that the i/p reaches R206 (RLK, RLD). Check that the common i/p is switched to 0V (RLK).
Reading zero on the faulty range	Relay appropriate to one range.	Check RLL, RLN, RLP or RLR as appropriate.
Low reading on one or more ranges	Relay contacts could be sticking	Check relays RLL, RLN, RLP or RLQ for sticking contacts. Only one should be energised for each range.

Check V~ mode with an i/p of about 1V at 1kHz.

Sympton	Possible Fault	Action
Zero reading on all ranges	IC211 not switching correctly	Check the input to IC211/11, and the output from IC211/8.
Readings are incorrect		Check the o/p of the input amplifier (TP1) for the correct ac gain. Check that the o/p of the rms convertor on IC202/10 is about 1V dc.

8 KEYBOARD FAILURE

Locator scans its keyboard at 50Hz. If any key is pressed, all other key selections are ignored, including the key switch on the Logic Probe, until the first key is released. Thus a stuck key can cause a total lock out. IC305 is clocked at 400Hz by the Frequency Gate Start line from IC14/3 and provides the scan. The output Display Sync. from IC304/6 is taken to IC82/2. If this is not correct, Locator will cycle through its power-up tests (see section 1.1).

The following tests assume that the Locator power-up tests function normally and 7201 rEAdY is displayed. If instead, Locator jumps to any specific function e.g. Frequency, then that is the key which is stuck.

Symptom	Action
Keyboard lockout (no keys work)	Check IC83, pins 2,4,6,8,11,13,15,17. All should be at logic 1 (>2V) if no key is pressed. Check IC83/2, while pressing FREQUENCY on failed keyboard. It should be 50Hz, 2.5ms width from -ve to +ve edge. Check IC83/1,19 (Node X012) in FREE RUN test mode. Change IC83.
Keys give wrong result	Check keyboard is plugged into display board PL301 correctly. Check ribbon cable is plugged into SK9 and SK302 correctly. Measure DELAY on testing Locator. Connect START on micropod to IC305/10, and GROUND to IC305/8. Set START and STOP TRIGGER POLARITIES to +ve. Probe IC 305 outputs 0 to 6 on pins 2,1,3,7,11,4,5 respectively. The delay to PIN 2 should be 2.5ms. For other pins the delay should increase by 2.5ms for each pin.
Partial key failure	Failure of all keys in one vertical row on Locator keyboard implies failure of one input to IC83. Failure of all keys in one horizontal row implies failure of a signal K0-K6 output of IC303 or IC304 on display board. In either case, the fault may be traced using the schematic diagrams of the keyboard and PL301 on the display board.

9 INTERMITTENT RESETS

9.1 Check that the Display Sync. on IC82/2 is 50Hz, and stable.

9.2 Set SW2 gang 6 ON and all other gangs OFF. This switches off the ROM chips and lets the Reset (IC75/40) run free. Measure Period/Width of IC75/40 from +ve to -ve edge. This is the Watch Dog Timeout time, and must be greater than 20ms. The typical value is 27ms, and normal tolerance is ± 5ms. If value is too low, check or change R11 and C2, or change IC93/3.

9.3 If the problem disappears when the covers are removed, it is probably a component failure at high temperature. The instrument should be warmed up (e.g. by a hot-air blower) and it may be possible to isolate the faulty component.

9.4 Radio Frequency Interference (RFI) can cause resets to occur by interfering with the data bus. It is more likely to give error signals on the Logic Probe, so check that Locator reads Test 81 of table 2 correctly, and without any spurious mis-readings.

9.5 Noise on the power input can give problems. Check the voltage selector and the main supply voltage.

10 POWER SUPPLY FAULTS

10.1 Blown 0.4A fuse

Symptom	Action	Effect
0.4A fuse blows Note: this fuse can only fail when 240V has been on the ac power	Ensure ac power switch is set at 240V. Remove any load. Replace fuse. Switch on ac power switch	Fuse does not blow - fault cleared
Fuse blows again.	Check for dc short circuits on the ac power primary windings (approx.18Ω each). Check bridge D403-D046 for short circuit diodes. Check C405 for short circuit.	Fuse does not blow - fault cleared.

10.2 Blown 0.8A fuse

0.8A fuse blows Note: This fuse could fail when 110V or 240V have been selected on the ac power switch.	Same action as for 0.4A fuse Check ac power filter N401 for short circuit	Fuse does not blow - fault cleared.

10.3 Blown 3.15A fuse

Symptom	Action	Effect
3.15A fuse blows	Remove any load Replace fuse Switch on ac power	
		Fuse does not blow - fault cleared.
Fuse blows again	Check in TR401, TR403 that the b-c junction is not o/c and that the c-b junction is not s/c. Check that R402, R408 have not burnt out. Check that D401, D408 have not gone s/c. Check to see if C435, C436 have gone s/c. Check for s/c in the wiring Remove all faulty components and replace them. Disconnect DP12, DP13, DP14. Replace fuse. Switch on ac power	
		Fuse should not blow
	Check the rail voltage	
		Should be approx 26V.
	Switch off ac power and re-connect DP14. Connect a 1kΩ load from DP12 to ground and a 1kΩ load fromm DP13 to ground. Switch on ac power Observe the waveforms at DP12 and DP13.	
		Should be a 30kHz square wave of 26V amplitude with a duty cycle of <50%.
Either waveform missing	Check TR402, TR404 and replace if necessary.	
		If correct go to 3.24, otherwise 3.18 or 3.21.
	Check that R404, R406 have not burnt out. Repeat Actions 3.15, 3.16, 3.17.	
		If correct go to 3.24.

Symptom	Action	Effect
Both waveforms missing	Check that the o/p on pins 1-16 of IC401 and IC402 are within the tolerances of those given in the following table:-	

IC401 (with load on -5.2V rail)

Pin No.	Output	Tol
1.	0V	±0.3V
2.	+0.6V	±0.12V
3.	<2.5V	
4.	oV	±0.3V
5.	70kHz sawtooth waveform	±14kHz
6.	3.8V	±0.8V
7.	0V	±0.3V
8.	+22V (approx)	±5.0V
9.	22V square waveform	±4.5V
10.	-	-
11.	-	-
12.	+22V	±4.5V
13.	+5V	±1V
14.	+5V	±1V
15.	0V	±0.3V
16.	0V	±0.3V

IC402 (with load on +5V rail)

Pin No.	Output	Tol
1.	0V	±0.3V
2.	+4.8V(approx)	±1.0V
3.	<2.5V	
4.	0V	±0.3V
5.	70kHz sawtooth waveform	±14kHz
6.	3.8V	±0.8V
7.	0V	±0.3V
8.	+25V	±5.0V
9.	25V square waveform	±5.0V
10.	-	-
11.	-	-
12.	+25V	±5.0V
13.	+5V	±1.0V
14.	+5V	±1.0V
15.	0V	±0.3V
16.	0V	±0.3V

Symptom	Action	Effect
Readings on IC's are incorrect	Replace IC's as necessary Repeat Actions 3.15, 3.16, 3.17 Remove 1kΩ loads and re-connect DP12 and DP13. Connect a 25V supply (at a current limit of 1A) to the dc input of the power supply. Remove all loads on the +5V, -5.2V and +12V rails. Switch on.	Continue with 3.24. This will switch on the ac power supply unit as there is no switch on the dc i/p.
	Check that the current drawn is <200mA. Remove alternately DP12 and DP13 to isolate the faulty rail. Check C427, C430 (for DP12) and C431, C434 (for DP13) For S/C	Fault cleared. If the current drawn is is >200mA continue with action 3.29.
If the capacitors are not s/c	Replace L401 (for DP12) or L402 (for DP13). Check that the retaining bolts which hold the inductances in position do not s/c the turns to ground. Repeat Action 3.24.	

10.4 D.C input not functioning

D.C. i/p not functioning	Check wiring to Sk402 Check that D402 is wired-in correctly. Check that D402 is not o/c Repair as required.	Fault cleared.

Symptom	Action	Effect
10.5 + 12V rail out of specification		
+12V rail out of specification	Check for the following voltages on IC403. Pin 1 - +25V Pin 2 - 0V Pin 3 - 12V ± 5%	
		Fault not corrected
Replace IC403	Check that R444 is not burnt out. Note: That R444 causes the +12V rail to be poorly regulated when loaded Replace R444 if necessary	Fault cleared
10.5 + 12V rail low		
Has the +5V crowbar fired If, after Action 8.2, the crowbar is O.K. but still fires. If the crowbar has not fired and the rail is still low.	If it has fired, go to Action 8.2 Go to Action 6.5.	
	Check that the waveform at DP13 is present. Note: That the o/p is larger the greater the duty cycle.	
If the waveform is not present, the fault lies in pcb4. If the waveform is present and +5V rail is low, the fault lies in the power o/p and rectification stage.	Go to Action 6.5	
If the crowbar fired because the rail voltage is too high.	Check feedback components R428, R437 and R438 on board 4. Check that the common reference voltage is correct (4.74V for +5.0V o/p). Check that pin 14 of IC402 is at +5.0V ± 5%. Check that the Op.Amps in IC402 are functioning correctly as per sympton 11.	Fault cleared

10.7 -5.2V rail low

Symptom	Action	Effect
Has the -5.2V crowbar fired?	If it has fired, go to Action 9.2.	
If after action 9.2 the crowbar is OK but still fires.	Go to Action 7.5.	
If the crowbar has not fired.	Check that the waveform at DP12 is present. **Note:** That the o/p is larger the greater the duty cycle.	
If the waveform is not present, fault lies in pcb 4.	Go to action 7.5.	
If the waveform is present and -5.2V is low fault lies in the power o/p and rectification stage.		
If the crowbar fired because rail voltage is too high.	Check feedback components R415, R417, R420 and IC401 on board 4. Check that the Op. Amps. in IC401 are functioning correctly as per sympton 11.	Fault cleared

10.8 +5V crowbar failure

The crowbar has not fired.	Go to test 8.6.	
The crowbar has fired early.	Turn off the ac power supply. Set a bench supply to 0V with a current limit of, 500mA and connect it across the +5V rail output. Gradually increase the bench supply and observe the voltages at which the crowbar fires.	This should be not less than +5.5V.
The crowbar fires at less than +5.5V.	Check the zener diode D413 and then the SCR 401 for s/c. Check R443.	Both OK.
	Replace faulty components and repeat action 8.2.	Crowbar should now work OK.

Symptom	Action	Effect
The crowbar has not fired.	Apply 8V from the bench supply and measure the gate-cathode voltage of SCR401.	If this is greater than 1.5V it has failed.
	Measure voltage across R440	If this is greater than 1V it has failed.
	Measure voltage across D413.	If this is greater than 6.5V it has failed.
	Replace all failed components and repeat Action 8.2	Crowbar should now work correctly.
10.9 - 5.2V crowbar failure		
The crowbar has not not fired.	Go to Action 9.6	
The crowbar has fired early.	Turn off the ac power supply. Set a bench supply to 0V with a current limit of 500mA and connect it across the -5.2V rail output. Gradually increase the bench supply and observe the voltage at which the crowbar fires.	This should be not less than -5.5V.
The crowbar fires at less than -5.5V.	Check the zener diode D411 and the SCR402 for s/c. Check R412.	Both OK.
	Replace faulty components and repeat Action 9.2.	Crowbar should now work OK.
The crowbar has not fired.	Apply -8V from the bench supply and measure the gate to cathode voltage of SCR402.	If this is greater than 1.5V it has failed.
	Measure voltage across R413	If this is greater than 1V it has failed.
	Measure voltage across D411	If this is greater than 6.5V it has failed.
	Replace all failed components and repeat Action 9.2.	
Crombar should now work correctly.		

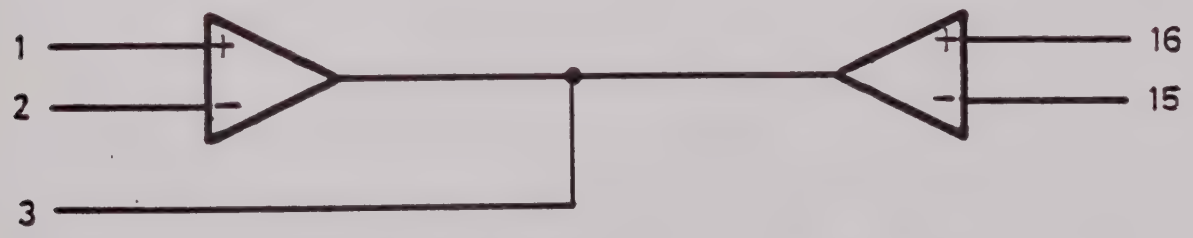
10.10 +5V current limit failure

Symptom	Action	Effect
+5V Current limit Failure	Apply a load which draws a calculated current, and check the voltage drop across R410. Calculate from these figures, the value of R410.	R410 should be 30mΩ ± 10%.
R410 is OK but +V current limit still fails	Check the following components on pcb 4:- R441, R442, R439, R436 IC402 Check the Op.AmP behaviour of IC402 (see diagram and note below sympton 11.)	Fault corrected.

10.11 -5.2V current limit failure

-5.2V current limit failure	Apply a load which draws a calculated current, and check the voltage drop across R409. Calculate from these figures, the value of R409.	R409 should be 100mΩ ± 10%.
R409 is OK but -5.2V current limit still Fails	Check the following components on pcb 4: R411, R416, R424, IC401. Check the Op.Amp behaviour of IC402 (See diagram and note below).	Fault corrected.

Note: Op.Amp behaviour of IC401 and IC402



O/P pin 3 is the higher of the two Op.Amps and swings between pin 7 (low) and pin 14.

10.12 Switching spikes on O/P too large

Symptom	Action	Effect
Spikes too large	Check that power wiring arrangements are IDENTICAL to previous functioning models. Check that TR401 and TR403 are BDY92 types. Check that D401 is an MBR340P/V3K340P, or equivalent SCHOTTKY diode.	

11 STIMULUS Vcc SIGNATURE INCORRECT

11.1 Connect testing Locator START and STOP inputs to the AUX test point. CLOCK and GROUND connections are not changed.

11.2 Check the Vcc signature. If correct, check the signature on S/S STIM Test Point and IC84, as give in section 2.5.

If the Vcc signature is incorrect the STIMULUS program is not running. Go to FREE RUN test mode (see section 2.2)

11.3 Check the following signatures and if correct proceed to the next node listed. If incorrect trace fault back through the circuit:

Aux Test Point (section 2.5)
R/W - IC94/8 Node X070
IC71-IC74, pins 18 and 20
All IC75 pins
Bi-directional Data bus (section 2.4)

11.4 Use Micropod 72401 if available, with 7201 STIMULUS program ROM. The signatures with Micropod are defined in a separate document, available with the ROM chip. This test allows the STIMULUS program to run independently of hardware faults on the Main Logic Board of Locator. Note that with Micropod in STIMULUS mode, S2, gang 2 should be ON and all other gangs OFF.

11.5 If Micropod is not available, check the correct operation of S2. Use the Logic Probe and its LED to check that if a switch is ON, the voltage is low and if it is OFF, the voltage is high (LED bright and not flashing).

Trace the STIMULUS switch (gang 2) to IC58/17.

12 MISCELLANEOUS FAULTS

12.1 Defective Logic Probe LED

Check the -5.2V supply.
Run Self Test and fault find any Fail Codes
Set up STIMULUS Test Mode.

Check IC50/9 Node X141
IC50/10 Node X140
IC45/11 Node X143

Check that IC45/10 is LOGIC Hi
Check that IC56/3 is LOGIC Hi
Short IC50/6 to IC50/7 and check that the LED in the Probe is ON.

If LED in the Probe is not ON, check R103 and the wiring to Logic Probe.

Remove shorting link.

Check IC56/12 is not stuck at Logic 0.

Check that the following nodes are generating 7Hz approximately.

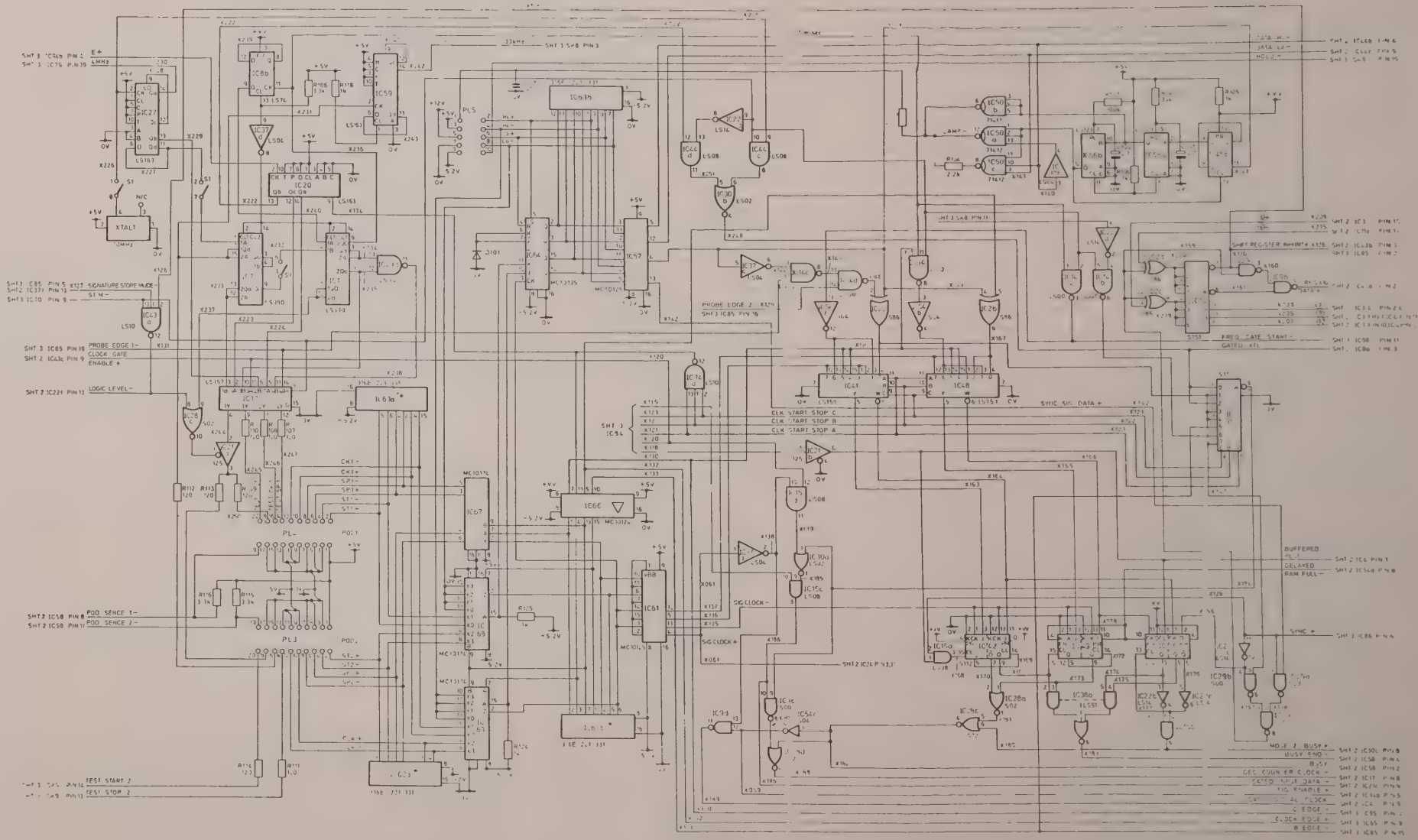
IC45/9
IC56/13
IC56/12
IC45/13

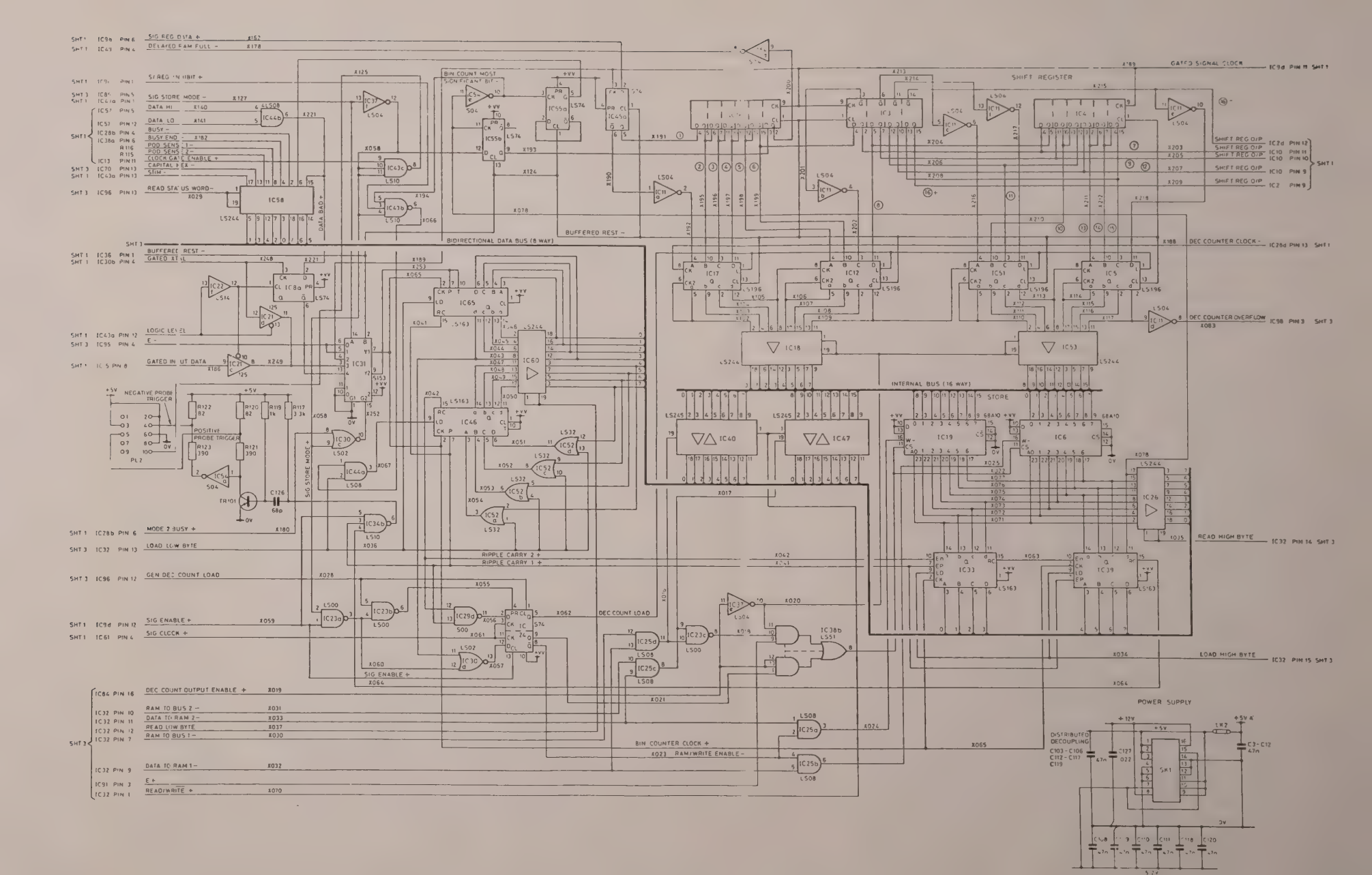
12.2 No Bleep on key press

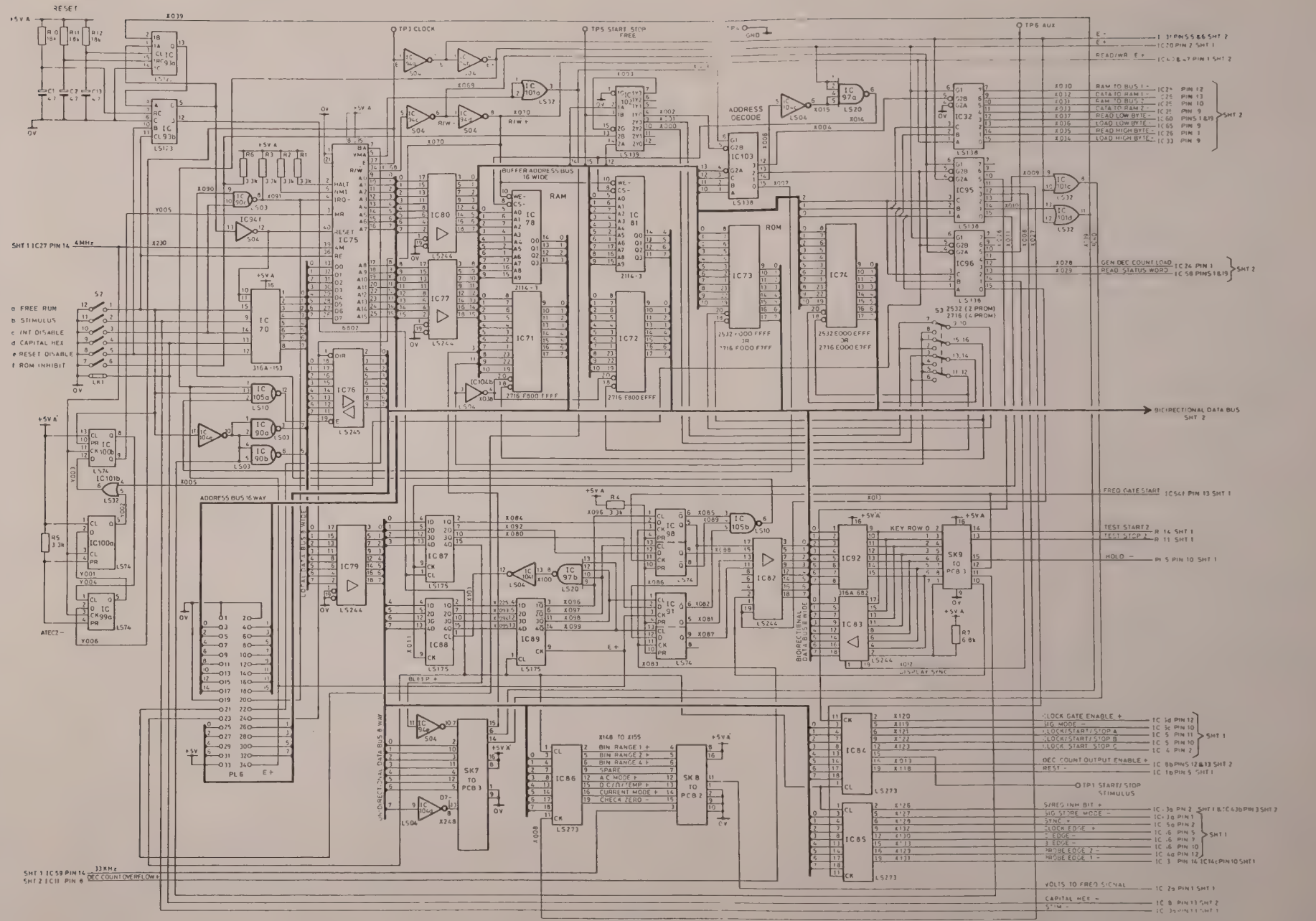
If the key function is not normal, fault find the keyboard using Section 8.

If key function is normal but no Bleep is given, connect Logic Probe to IC94/10. The Logic Probe LED should be bright. Press a valid key (e.g. FREQENCY). The LED on the logic Probe should flash off once for each key press. If it does, check the wiring to the Bleeper on the Display Board (See Section 4 for access instructions.)

Of IC94/10 is faulty, check the inverters input IC94/11 and the driver IC87/15.




SIG REG DATA +
DELAYED RAM FULL –
SIG REG INHIBIT +
SIG STORE MODE –
DATA HI
DATA LO
BUSY –
BUSY END –
POD SENS 1 –
POD SENS 2 –
CLOCK GATE ENABLE +
CAPITAL LETTER –
STOP –
READ STATUS WORD –
BIN COUNT MOST SIGNIFICANT BIT –
BUFFERED REST –
BIDIRECTIONAL DATA BUS (8 WAY)
GATED SIGNAL CLOCK
SHIFT REGISTER
SHIFT REG O/P
DEC COUNTER CLOCK –
DEC COUNTER OVERFLOW
INTERNAL BUS (16 WAY)
STORE
LOGIC LEVEL
GATED INPUT DATA
NEGATIVE PROBE TRIGGER
POSITIVE PROBE TRIGGER
MODE 2 BUSY +
LOAD LOW BYTE
GEN DEC COUNT LOAD
SIG ENABLE +
SIG CLOCK +
RIPPLE CARRY 2 +
RIPPLE CARRY 1 +
DEC COUNT LOAD
READ HIGH BYTE
LOAD HIGH BYTE
DEC COUNT OUTPUT ENABLE +
RAM TO BUS 2 –
DATA TO RAM 2 –
READ LOW BYTE
RAM TO BUS 1 –
DATA TO RAM 1 –
E +
READ/WRITE +
BIN COUNTER CLOCK +
RAM/WRITE ENABLE –
POWER SUPPLY
+ 12V
+ 5V
+ 5V A
DISTRIBUTED DECOUPLING
SK1


RESET
TP3 CLOCK
TP5 START STOP FREE
TP6 AUX
ADDRESS DECODE
BUFFER ADDRESS BUS 16 WIDE
RAM
ROM
BIDIRECTIONAL DATA BUS SHT 2
ADDRESS BUS 16 WAY
KEY ROW 0
DISPLAY SYNC
TP1 START/ STOP STIMULUS
FREE RUN
STIMULUS
INT DISABLE
CAPITAL HEX
RESET DISABLE
ROM INHIBIT
6MHz
33KHz
DEC COUNT OVERFLOW +
FREQ GATE START
TEST START 2
TEST STOP 2
HOLD –
CLOCK GATE ENABLE +
SIG MODE –
CLOCK/START/STOP A
CLOCK/START/STOP B
CLOCK START STOP C
DEC COUNT OUTPUT ENABLE +
REST –
VOLTS TO FREQ SIGNAL
CAPITAL HEX –
STIM –
GEN DEC COUNT LOAD
READ STATUS WORD
READ/WR E +
BAM TO BUS 1 –
DATA TO RAM 1 –
BAM TO BUS 2 –
DATA TO RAM 2 –
READ LOW BYTE –
LOAD LOW BYTE –
READ HIGH BYTE –
LOAD HIGH BYTE –

CHAPTER 2
CHARACTERISATION TABLES & CIRCUIT DIAGRAMS

ISSUE 1

This section of Chapter 2 contains the characterisation tables and circuit diagrams pertinent to models of Locator which have no Mod. Strike label. The table of contents is listed below.

Section	Title	Page
1.	Main Characterisation Tables	2.1
2.	Memory Ready Tables	2.25
3.	Display Board Tables	2.26
4.	Databus Tables and Software Issue	2.28
5.	Auxiliary Tables	2.29
6.	Circuit Diagrams	2.31

CHARACTERISATION TABLES, PRE-MODEL 200217

1. Main Characterisation Tables (Issue 1)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	⌠	⌠	⌡	1	0003
2.	Stimulus	⌠	⌡	⌡	1	2358

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clk	Gnd
2.	SS Stim	SS Stim	Clk	Gnd

NOTES:
1. Check the following clock frequencies are present on the IC pins given: IC27/2 = 10MHz; IC27/11 = 1 MHz; IC27/13 = 2MHz; IC27/14 = 4MHz.
2. Datapod 2 must not be connected.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
A0	IC75-9 IC80-3 IC71-8 IC74-8 IC32-2	IC80-17 IC78-5 IC73-8 IC96-1	PL6-3 IC81-5 IC72-8 IC95-1	SIG UUUU 32766cE	SIG 36HA 93610ct
A1	IC75-10 IC80-5 IC71-7 IC74-7 IC32-3	IC80-15 IC78-6 IC73-7 IC96-2	PL6-4 IC81-6 IC72-7 IC95-2	SIG FFFF 16384cE	SIG 9F26 69376ct
A2	IC75-11 IC80-7 IC71-6 IC74-6	IC80-13 IC78-7 IC73-6 IC96-3	PL6-5 IC81-7 IC72-6 IC95-3	SIG 8484 8192cE	SIG 12FU 44554ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification			Measured Value 1	Measured Value 2
	Circuit ID	Circuit ID	Circuit ID		
A3	IC75-12 IC80-9 IC71-5 IC74-5	IC80-11 IC78-4 IC73-5	PL6-6 IC81-4 IC72-5	SIG P763 4096cE	SIG 2F1U 21019cE
A4	IC75-13 IC80-12 IC71-4 IC74-4	IC80-8 IC78-3 IC73-4	PL6-7 IC81-3 IC72-4	SIG 1U5P 2048cE	SIG AA46 39089ct
A5	IC75-14 IC80-14 IC71-3 IC74-3	IC80-6 IC78-2 IC73-3	PL6-8 IC81-2 IC72-3	SIG 0356 1024cE	SIG 35H6 32888ct
A6	IC75-15 IC80-16 IC71-2 IC74-2	IC80-4 IC78-1 IC73-2	PL6-9 IC81-1 IC72-2	SIG U759 512cE	SIG 64U9 31150ct
A7	IC75-16 IC80-18 IC71-1 IC74-1	IC80-2 IC78-17 IC73-1	PL6-I0 IC81-17 IC72-1	SIG 6F9A 256cE	SIG FPA9 36192ct
A8	IC75-17 IC77-3 IC71-23 IC74-23	IC77-17 IC78-16 IC73-23	PL6-11 IC81-16 IC72-23	SIG 7791 128cE	SIG U830 35416ct
A9	IC75-18 IC77-5 IC71-22 IC74-22	IC77-15 IC78-15 IC73-22	PL6-12 IC81-15 IC72-22	SIG 6321 64cE	SIG 37H2 35908ct
A10	IC75-19 IC71-19 IC74-19	IC77-13 IC73-19 IC103-1	PL6-13 IC72-19 IC77-7	SIG 37C5 32cE	SIG 1867 34882ct
A11	IC75-20 IC77-9 SW3-8 IC103-2	IC77-11 SW3-4 SW3-1	PL6-14 SW3-5 IC104-3	SIG 6U28 16cE	SIG F6HA 12812ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
A12	IC75-22 IC77-12	IC77-8 IC102-14	PL6-15 IC103-3	SIG 4FCA 8cE	SIG 8118 37948ct
A13	IC75-23 IC77-14	IC77-6 IC103-4	PL6-16	SIG 4868 4cE	SIG 421C 2ct
A14	IC75-24	IC77-4 IC102-2	PL6-17 IC77-16	SIG 9UP1 2cE	SIG C39U 46138ct
A15	IC75-25 IC77-18	IC77-2 TP5	PL6-18 IC102-3	SIG 0002 1cE	SIG C39U 46138ct
X000	IC102-10	SW3-6	SW3-3	SIG 3H3C 2cE	Logic Hi
X001	IC102-9	SW3-2	SW3-7	SIG H785 2cE	SIG 90F7 46138ct
X002	IC102-4	IC103-5		SIG 755H 1cE	SIG C39U 46138ct
X003	IC102-7	IC102-15		SIG PACH	SIG C39U 46138ct
X004	IC103-12	IC32-5		SIG 5P1A 1cE	SIG H8CE 2552ct
X005	IC103-13 IC101-4	IC96-5	IC95-5	SIG 282A 1cE	SIG 0374 24634ct
X006	IC103-14	IC104-5		SIG 02H5 1cE	SIG 7983
X007	IC103-15	IC105-2		SIG 3APP 1cE	SIG 2358
X008	IC95-12	IC86-11			SIG U8H5 18ct
X009	IC95-13	IC101-9			SIG 7P06 1020ct
X010	IC95-14	IC101-13			SIG C26H 20988ct
X011	IC95-15	IC87-9	IC88-9		SIG 071H 510ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X012	IC96-14	IC83-1	IC83-19	SIG CP01 256c	Logic Hi
X013	IC96-15	IC82-1	IC82-19	SIG U80E 256c	Logic Hi
X014	IC97-6	IC78-8	IC81-8	SIG 02H5 2048cE	SIG 7983 2064ct
X015	IC104-6	IC97-4	IC97-5	SIG 02H6 1cE	SIG 5AHC
X016	IC25-11	IC23-10	IC40-19	SIG U1H4 512cE	SIG FF87 254ct
X017	IC25-8	IC23-9	IC47-19	SIG F75H 512cE	SIG H8c0 254ct
X018	IC23-8	IC38-10		SIG 3689 1024cE	SIG 1437 508ct
X019	IC84-16 IC38-13	IC37-11	IC38-12		SIG 8C7U 4ct
X020	IC37-10 IC18-19	IC38-11 IC53-1	IC18-1 IC53-19		SIG A827 4ct
X021	IC24-9	IC38-1			SIG HC79 1298ct
X022	IC38-8	IC19-11	IC6-11	SIG 368A 1024cE	SIG PF16 1806ct
X023	IC24-8	IC25-2	IC25-4		SIG U821 1298ct
X024	IC25-3	IC19-16			SIG 03F9 1552ct
X025	IC25-6	IC6-16			SIG 17UP 1552ct
X026	IC95-10	IC84-11			SIG 0337 532ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X027	IC95-11	IC85-11			SIG CH90 540ct
X028	IC96-12	IC23-5	IC24-1	SIG ACP3 256cE	SIG 8P70 2ct
X029	IC96-13	IC58-1	IC58-19	SIG AU83 256cE	Logic Hi
X030	IC32-7	IC25-12		SIG U1H4 512cE	Logic Hi
X031	IC32-10	IC25-10		SIG F75H 512cE	Logic Hi
X032	IC32-9	IC25-13	IC25-5		SIG FF87 254ct
X033	IC32-11	IC25-9	IC25-1		SIG H8C0 254ct
X034	IC32-15	IC33-9	IC39-9		SIG 3F76 510ct
X035	IC32-14	IC26-1	IC26-19	SIG 75P9 512cE	Logic Hi
X036	IC32-13 IC52-1 IC52-13	IC44-2 IC52-4	IC65-9 IC52-10		SIG H3A1 510ct
X037	IC32-12	IC60-1	IC60-19	SIG 1H79 512cE	Logic Hi
X038	IC104-4	IC71-20	IC72-20	SIG 6U2C 16cE	SIG P582
X039	IC101-11	SKT7-6	IC93-2		SIG C26H 20988ct
X040	IC101-8	SKT7-14			SIG 7P06 1020ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X041	IC65-15 IC29-13	IC46-7 IC33-7	IC34-3 IC39-7		SIG FUFC 2958ct
X042	IC46-15	IC29-12	IC33-10		SIG P4H0 296ct
X043	IC65-11	IC60-8	IC30-11		SIG 1121 2990ct
X044	IC65-12	IC60-6			SIG HU54 5928ct
X045	IC65-13	IC60-4			SIG P45P 11966ct
X046	IC65-14	IC60-2			SIG 0844 23930ct
X047	IC46-14	IC60-11			SIG 70CA 1422ct
X048	IC46-13	IC60-13			SIG P841 742ct
X049	IC46-12	IC60-15			SIG 4835 402ct
X050	IC46-11	IC60-17			SIG C3CA 296ct
X051	IC52-11	IC46-6			SIG 52H3 254ct
X052	IC52-8	IC46-5			SIG FU34 254ct
X053	IC52-6	IC46-4			SIG U91F 254ct
X054	IC52-3	IC46-3			SIG PHC8 254ct
X055	IC23-6	IC24-4			SIG FH6A 6ct
X056	IC29-11	IC24-2			SIG 8287 424ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X057	IC30-13	IC24-12			SIG AA80 1298ct
X058	IC37-12 IC43-4 IC23-2	IC43-10 IC55-12	IC43-11 IC30-9		SIG 2755 128ct
X059	IC54-6 IC23-1	IC9-12 IC24-13	IC34-5		SIG 1U84 6ct
X060	IC23-3	IC23-4	IC30-12		SIG 431A 4ct
X061	IC61-4 IC24-11	IC37-1	IC24-3		SIG UPH1 149087ct
X062	IC24-5 IC51-1	IC17-1 IC5-1			SIG 60F9 322ct
X063	IC33-15	IC39-10	IC12-1		SIG F441 50ct
X064	IC39-15	IC34-4			SIG CF2C 2ct
X065	IC31-7 IC33-2	IC65-2 IC39-2	IC46-2		SIG 3935 91140ct
X066	IC43-6	IC44-1			SIG FFPH 66ct
X067	IC44-3	IC46-9			SIG 6P4F 514ct
X068	IC75-34	IC94-5			SIG 856U 25652ct
X069	IC94-6 IC96-4	IC94-9	IC95-6		SIG A637 25652ct
X070	IC94-8 IC81-10 IC40-1	IC76-1 PL6-24 IC47-1	IC78-10 IC32-1		SIG 856U 25652ct
X071	IC33-14 IC26-2	IC19-23	IC6-23		SIG 4987 466ct
X072	IC33-13 IC26-4	IC19-22	IC6-22		SIG 8959 234ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X073	IC33-12 IC26-6	IC19-21	IC6-21		SIG 85C5 116ct
X074	IC33-11 IC26-8	IC19-20	IC6-20		SIG PCFP 58ct
X075	IC39-14 IC26-11	IC19-19	IC6-19		SIG 36H1 28ct
X076	IC39-13 IC26-13	IC19-18	IC6-18		SIG HUA5 14ct
X077	IC39-12 IC26-15	IC19-17	IC6-17		SIG 1450 6ct
X078	IC39-11 IC54-11	IC26-17	IC55-11		SIG PPH7 2ct
X079	IC75-5 IC101-3	IC101-1 PL6-21	IC101-2 IC103-6		SIG 60F0 67658ct
X080	IC87-10	IC91-2			SIG 5550 64ct
X081	IC91-5	IC82-13			SIG 4018 160ct
X082	IC91-6	IC105-5			SIG 6340 176ct
X083	IC11-8	IC91-11	IC98-3		SIG 15U2 24ct
X084	IC87-2	IC98-2			SIG 0PA5 254ct
X085	IC98-6	IC105-3			SIG 7547 2ct
X086	IC98-5	IC82-17	IC91-12		SIG 561U 2ct
X087	IC91-9	IC82-11			SIG 79HU 2ct
X088	IC98-9	IC82-15			Logic Lo

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X089	IC98-8	IC105-4			Logic Hi
X090	IC105-6	IC90-9			SIG 1602 192ct
X091	IC90-8	IC75-4	PL6-20		SIG 355U 177ct
NOTE: Switch Clock edge to +ve (∫)					
X092	IC87-7	IC98-12			SIG 9020 128ct
X225	IC88-2	IC89-4			SIG HCA1 256ct
X093	IC88-7	IC89-5			SIG 8HCA 256ct
X094	IC88-10	IC89-12			SIG 86C9 256ct
X095	IC88-15	IC89-13			SIG FH75 256ct
NOTE: Switch Clock edge to -ve (l)					
X096	IC89-3	IC97-9	IC98-1		SIG U8U9 256ct
X097	IC89-6	IC97-10	IC98-13		SIG APP2 256ct
X098	IC89-11	IC97-12	IC91-1		SIG A5P1 256ct
X099	IC89-14	IC97-13	IC91-13		SIG PP2H 256ct
X100	IC97-8	IC104-13			SIG A9FH 480ct
X101	IC104-12	IC88-1			SIG 8A95 480ct
X102	IC17-5	IC17-6	IC18-2		SIG 1U03 13334ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X103	IC17-9	IC18-4			SIG 0F40 5348ct
X104	IC17-2	IC18-6			SIG 341F 2682ct
X105	IC17-12	IC12-8			SIG 767A 2680ct
X106	IC12-5	IC12-6	IC18-17		SIG 5500 1350ct
X107	IC12-9	IC18-15			SIG 1276 552ct
X108	IC12-2	IC18-13			SIG 79P0 288ct
X109	IC12-12	IC51-8	IC18-11		SIG C951 286ct
X110	IC51-5	IC51-6	IC53-2		SIG 691U 154ct
X111	IC51-9	IC53-4			SIG 6P71 70ct
X112	IC51-2	IC53-6			SIG 744A 48ct
X113	IC51-12	IC5-8	IC53-8		SIG P21A 46ct
X114	IC5-5	IC5-6	IC53-17		SIG 9F41 30ct
X115	ICV5-9	IC53-15			SIG 9445 26ct
X116	IC5-2	IC53-13			SIG 0HU1 26ct
X117	IC5-12	IC11-9	IC53-11		SIG 36AA 24ct
X118	IC84-19	IC21-5			SIG P9A7 6ct
X119	IC84-5	IC15-10			SIG 434F 128ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X120	IC84-2 IC13-11	IC15-12	IC43-9		SIG 30U5 256ct
X121	IC84-6 IC48-11	IC34-13 IC35-11	IC41-11		SIG 9HA6 66ct
X122	IC84-9 IC48-10	IC34-1 IC35-10	IC41-10		SIG U7PH 34ct
X123	IC84-12 IC48-9	IC34-2 IC35-9	IC41-9		SIG 72P4 18ct
X124	IC21-6 IC55-1 IC16-1 IC12-13 IC4-1	IC31-2 IC45-1 IC3-1 IC51-13 IC36-1	IC55-13 IC17-13 IC15-1 IC5-13		SIG P9A7 6ct
X125	IC43-8	PL2-10			SIG 9H89 127ct
X126	IC85-2 IC9-1	IC43-3 IC10-7	IC43-2		SIG AHHA 258ct
X127	IC85-5 IC43-1	IC37-13	IC31-14		SIG 040H 128ct
X128	IC85-6 IC29-2	IC15-2	IC22-11		SIG P6PH 66ct
X129	IC85-16	IC14-12			SIG U53C 4ct
X130	IC85-12 IC41-15 IC48-15	IC66-7 IC34-10	IC41-14 IC48-14		SIG PC4F 24ct
X131	IC85-19	IC14-10	IC13-14		SIG 63U7 2ct
X132	IC85-9	IC66-51	IC2-51		SIG 5P8F 32ct
X133	IC85-15	IC66-10	IC35-14		SIG 44UU 12ct
X134	IC34-12	IC66-11	IC20-9		SIG 3203 18ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X135	IC61-13 IC49-1	IC42-1 IC49-13	IC42-13		SIG HH89 149087ct
X136	IC61-5 IC41-2	IC41-12	IC41-1		SIG 5P92 239ct
X137	IC61-12	IC48-12	IC48-1		SIG 7UC4 32ct
X138	IC37-2	IC15-13	IC9-13		SIG HH89 149087ct
X139	IC15-11	IC30-2			SIG U83C 9597Cct
X140	IC57-5 IC37-3	IC44-5	IC50-10		SIG F617 37264ct
X141	IC57-12	IC44-4	IC50-9		SIG P54U 37264ct
X142	IC57-13	IC29-1			SIG C610 37262ct
X143	IC57-4 IC2-4	IC37-5 IC45-11	IC2-1		SIG F617 37264ct
X144	IC37-6	IC14-9			SIG P54U 37264ct
X145	IC14-8	IC14-13			SIG U667 2382ct
X146	IC14-11	IC2-2			SIG F88H 1124ct
X147	IC2-3 IC35-1 IC29-5	IC35-12 IC35-3	IC35-15 IC41-4		SIG 0P9A 37267ct
X148	IC86-2	SKT8-4			SIG FUH6 2ct
NOTE:	Nodes X149-X154 are not marked on the diagram. They are the lines on IC86 between nodes X148 and X155.				
X149	IC86-5	SKT8-5			SIG 6059 2ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X150	IC86-62	SKT8-6			SIG 9CPF 2ct
X151	IC86-9	SKT8-7			SIG CHU3 2ct
X152	IC86-12	SKT8-12			SIG 11C7 2ct
X153	IC86-15	SKT8-13			SIG 39A2 2ct
X154	IC86-16	SKT8-14			SIG 05F7 2ct
X155	IC86-19	SKT8-15			SIG 85F0 2ct
X156	IC22-10	IC29-4	IC36-2		SIG F5C5 66ct
X157	IC29-6	IC29-9			SIG 44CF 29380ct
X158	IC29-3	IC29-10			SIG H5C2 7945ct
X159	IC29-8 IC2-10	IC9-2	IC2-13		SIG 910P ct
X160	IC9-3	IC9-4			SIG F79C ct
X161	IC10-6	IC9-5			SIG F9PF ct
X162	IC9-6	IC45-2			SIG 0P77 ct
X163	IC41-5	IC42-3			SIG H43U 764ct
X164	IC41-6	IC42-11	IC36-3		SIG U767 760ct
X165	IC48-5	IC49-3			SIG 6UCA 1388ct
X166	IC48-6	IC49-11	IC36-11		SIG 4FP2 1388ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X167	IC2-6	IC48-4	IC48-2		SIG 989C 37296ct
X168	IC15-3	IC42-15			SIG 1H4F 4ct
X169	IC42-5	IC42-14			SIG 1H4F 4ct
X170	IC42-7	IC28-2			SIG 691U 4ct
X171	IC42-9	IC49-15	IC38-2		SIG 4A47 4ct
X172	IC49-5	IC49-14			SIG 43FF 4ct
X173	IC49-9	IC38-3	IC28-3		SIG 2A05 4ct
X174	IC36-9	IC38-5	IC22-3		SIG H5A5 4ct
X175	IC36-5	IC38-4			SIG 0H0F 2ct
X176	IC36-6	IC22-5			SIG 2P54 2ct
X177	IC22-6	IC15-4	IC36-13		SIG 0H0F 2ct
X178	IC54-8 IC36-10	IC49-4	IC49-10		SIG 8437 2ct
X179	IC22-4	IC15-5			SIG U6UH 4ct
X180	IC15-6	IC28-6	IC30-8		SIG 7UF6 2ct
X181	IC28-1	IC28-5			SIG 6042 4ct
X182	IC28-4 IC58-2	IC54-5	IC28-12		SIG 3FHF 6ct
X183	IC38-6	IC58-4			SIG 7C97 6ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X184	IC35-6	IC30-3	IC9-9		SIG 63F6 37248ct
X185	IC30-1	IC15-9			SIG 9508 41823ct
X186	IC15-8	IC9-10	IC21-9		SIG C981 31437ct
X187	IC9-8	IC28-11			SIG 2358 14390ct
X188	IC28-13	IC17-8			SIG 0000 13316ct
X189	IC9-11 IC3-9	IC45-3 IC4-9	IC16-9 IC31-2		SIG 29HC 127246ct
X190	IC45-6	IC11-1			SIG 5PFC 31884ct
X191	IC45-5	IC16-4			SIG 7H93 31884ct
X192	IC11-2	IC17-4			SIG 7H93 31884ct
X193	IC55-9	IC16-3			SIG 6519 2ct
X194	IC54-10	IC55-3	IC43-5		SIG FH8U 2ct
X195	IC16-5	IC16-6	IC17-10		SIG UCF4 31882ct
X196	IC16-7	IC16-11	IC17-3		SIG 0F62 31882ct
X197	IC16-10	IC16-13	IC17-11		SIG A72F 31880ct
X198	IC16-12	IC16-14	IC12-11		SIG C9F3 31880ct
X199	IC16-15	IC3-4	IC12-10		SIG 346H 31876ct
X200	IC16-2	IC54-9			SIG A76U 2ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X201	IC3-3	IC11-3			SIG 8137 31876ct
X202	IC11-4	IC12-3			SIG 826U 31876ct
X203	IC3-2	IC4-4	IC10-11		SIG A26U 31876ct
X204	IC4-5	IC3-5	IC12-11		SIG 5H66 31874ct
X205	IC3-7	IC4-12	IC10-10		SIG 7497 31874ct
X206	IC4-12	IC3-12	IC51-3		SIG 37U0 31870ct
X207	IC3-10	IC4-3	IC10-9		SIG 4CF7 31870ct
X208	IC4-15	IC5-3	IC3-13		SIG CFHP 31864ct
X209	IC3-15	IC2-9			SIG U4PC 31864ct
X210	IC4-10	IC4-13	IC51-10		SIG 2537 31872ct
X211	IC4-2	IC4-6	IC5-4		SIG 5P4C 31870ct
X212	IC4-7	IC4-14	IC5-10		SIG 0FHA 31868ct
X213	IC3-6	IC11-5			SIG 57FU 31874ct
X214	IC3-11	IC11-13			SIG 698U 31870ct
X215	IC3-14	IC11-11	IC2-12		SIG H7C3 31864ct
X216	IC11-6	IC51-4			SIG 7497 31874ct
X217	IC11-12	IC51-11			SIG 4CF7 31870ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X218	IC11-10	IC5-11			SIG U4PC 31864ct
X219	IC2-8 IC10-14	IC10-4 IC10-13	IC10-1		SIG 65P5 ct
X220	IC2-11 IC10-15	IC10-3 IC10-12	IC10-2		SIG 46CH ct
X221	IC44-6	IC58-5	IC8-2		Line Low unless data is bad
X222	IC20-13	IC44-2			SIG 50HH 74526ct
X223	IC20-12	IC13-2			SIG F617 37264ct
X224	IC20-14	IC13-5			SIG 7844 149055ct

X225 node follows X092 node in the table.

X226	Xtal 1	IC27-2	IC44-9	10MHz ± 200Hz	

NOTES:
1. For readings prefixed with P, select PERIOD/WIDTH, +ve START TRIGGER and +ve STOP TRIGGER.
2. For readings prefixed with W, select PERIOD/WIDTH, +ve START TRIGGER and -ve STOP TRIGGER.

X227	IC27-12	IC27-9		2MHz P 0.5µs	
X228	IC27-12	IC27-9		2MHz P 0.5µs	W 0.4µs
X229	IC27-13	IC13-6		2MHz P 0.5µs	W 0.2µs
X230	IC27-14 IC100-3	IC75-39 IC99-3	IC100-11	4MHz	W 0.1µs
X231	IC7-7 R112	IC7-15 PL3-16	IC59-2	100kHz P 10µs	W 2.0µs
X232	IC7-9	SW1-3	IC1-4	10kHz P 100.0µs	W 2.0µs

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X233	IC7-13	IC7-12	IC13-3	50kHz P 20µs	W 10µs
X234	IC1-3	IC1-15 P 1000µs	IC23-13 W 5000µs	100Hz	
X235	IC1-13	IC23-12	IC13-10	50kHz P 2000µs	W 10000µs
X236	IC1-9 IC34-9	IC8-11	IC14-1	400Hz P 2500µs	W 500µs
X237	IC1-7	IC1-12	IC28-9	2kHz P 500µs	W 100µs
X238	IC23-11	IC13-13		50Hz P 20000µs	W 15000µs
X239	IC8-8	IC8-12		200Hz P 5000µs	W 2500µs
X240	IC8-9	IC1-1		200Hz P 5000µs	W 2500µs
X241	IC59-12	IC59-9		33333Hz P 30µs	W 20µs
X242	IC59-14	SKT8-3		33333Hz P 30µs	W 10µs
X243	IC59-11	IC59-6		16667Hz P 60µs	W 30µs
X244	IC13-14	IC21-2			SIG F617 37264ct
X245	IC13-9	R110	PL4-20		SIG 30U5 255ct
X246	IC13-7	R103	PL4-16		SIG 7844 149055ct
X247	IC13-12	R107	PL4-14		SIG 63U7 2ct
X248	IC30-4 IC8-3	IC35-4 IC21-12	IC35-2		SIG 7385 74526ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X249	IC21-11	IC31-3	IC21-8		SIG C981
X250	IC21-3 PL4-18	R109 PL3-18	R113		SIG F617 37264ct
X251	IC44-11	IC30-5			SIG 50HH
X252	IC30-10	IC31-15			SIG 7CFC 130ct
X253	IC31-9	IC65-7	IC65-10		SIG 628A 6ct
X254	IC104-8	SKT7-13			SIG 83C8 139758ct
X255	IC107-3	IC106-12	IC110-2		SIG 2P54 2ct
X256	IC108-4	IC110-1	IC106-13		SIG CH02 38ct
X257	IC106-5	IC106-11			SIG 97U8 568ct
X258	IC107-6	IC109-4	IC109-10		SIG 3P14 4ct
X259	IC109-5	IC111-15	IC109-14		SIG 1H4F 4ct
X260	IC108-13	IC111-3			SIG P1U6 878ct
X261	IC108-10	IC108-11			SIG 3A41 1388ct
X262	IC109-9	IC108-9			SIG 1H4F 4ct
X263	IC107-11	IC110-10			SIG H71C 10ct
X264	IC110-6	IC107-12			SIG 563A 26ct
X265	IC110-5	IC108-3			SIG 7562 26ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X266	IC106-8	IC107-4	IC106-4		SIG 2H62 16ct
X267	IC107-8	IC108-6			SIG UP18 34ct
X268	IC111-5	IC111-14			SIG 1H4F 4ct
X269	IC108-1	IC110-3			SIG 7P5A
X270	IC110-9	IC36-1			SIG P9A7 6ct

MEASURED CHARACTERISATION VALUES

NOTE: Local bus is D0-D7;
Unidirectional bus is UD0-UD7;
Bi-directional bus is BD0-BD7;
Internal bus is ID0-ID15.

Inter-node Circuit Identification

Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
D0	IC75-33 IC76-18	IC70-1	IC79-17		SIG FP09 ct
D1	IC75-32 IC76-17	IC70-2	IC79-15		SIG C532 ct
D2	IC75-31 IC76-16	IC70-3	IC79-13		SIG F75F 133808ct
D3	IC75-30 IC76-15	IC70-4	IC79-11		SIG P248 ct
D4	IC75-29 IC76-14	IC70-5	IC79-8		SIG 3HAH ct
D5	IC75-28 IC76-13	IC70-6	IC79-6		SIG 9H95 ct
D6	IC75-27 IC76-12	IC70-7	IC79-4		SIG 71C8 ct
D7	IC75-26 IC76-11	IC70-8	IC79-2		SIG A0P0 ct
UD0	IC79-3 IC86-3	IC87-4 IC84-3	SKT7-2 IC85-3		SIG FP09 128394ct
UD1	IC79-5 IC86-4	IC87-5 IC84-4	SK7-10 IC85-4		SIG C532 98508ct
UD2	IC79-7 IC86-7	IC87-12 IC84-7	SKT7-3 IC85-7		SIG F75F 133808ct
UD3	IC79-9 IC86-8	IC87-13 IC84-8	SKT7-11 IC85-8		SIG P248 136698ct
UD4	IC79-12 IC86-13	IC88-4 IC84-13	SKT7-4 IC85-13		SIG 3HAH 131354ct
UD5	IC79-14 IC86-14	IC88-5 IC84-14	SKT7-12 IC85-14		SIG 9H95 87059ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
UD6	IC79-16	IC88-12	SKT7-5		SIG 71C8
	IC86-17	IC84-17	IC85-17		180746ct
UD7	IC79-18	IC88-13	IC104-9		SIG A0P0
	IC86-18	IC84-18	IC85-18		139758ct
BD0	IC76-2	IC78-14	IC83-3		SIG FP09
	IC92-1	PL6-25	IC71-9		121346ct
	IC73-9	IC72-9	IC74-9		
	IC82-3	IC58-3	IC60-18		
	IC40-18	IC47-18	IC33-3		
	IC26-18	IC65-3			
BD1	IC76-3	IC78-13	IC83-5		SIG C532
	IC92-2	PL6-26	IC71-10		97214ct
	IC73-10	IC72-10	IC74-10		
	IC82-5	IC58-5	IC60-16		
	IC40-17	IC47-17	IC33-4		
	IC26-16	IC65-4			
BD1	IC76-4	IC78-12	IC83-7		SIG F75F
	IC92-3	PL6-27	IC71-11		132516ct
	IC73-11	IC72-11	IC74-11		
	IC82-7	IC58-7	IC60-14		
	IC40-16	IC47-16	IC33-5		
	IC26-14	IC65-5			
BD2	IC76-5	IC78-11	IC83-9		SIG P248
	IC92-4	PL6-28	IC71-13		115180ct
	IC73-13	IC72-13	IC74-13		
	IC82-9	IC58-9	IC60-12		
	IC40-15	IC47-15	IC33-6		
	IC26-12	IC65-6			
BD4	IC76-6	IC81-14	IC83-12		SIG 3HAH
	IC92-5	PL6-29	IC71-14		128784ct
	IC73-14	IC72-14	IC74-14		
	IC82-12	IC58-12	IC60-9		
	IC40-14	IC47-14	IC39-3		
	IC26-9	IC52-2			
BD5	IC76-7	IC81-13	IC83-14		SIG 9H95
	IC92-5	PL6-30	IC71-15		84487ct
	IC73-15	IC72-15	IC74-15		
	IC82-14	IC58-14	IC60-7		
	IC40-13	IC47-13	IC39-4		
	IC26-7	IC52-5			

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
BD6	IC76-8 IC91-7 IC73-16 IC82-16 IC40-12 IC26-5	IC81-12 PL6-31 IC72-16 IC58-16 IC47-12 IC52-9	IC83-16 IC71-16 IC74-16 IC60-5 IC39-5		SIG 71C8 158720ct
BD7	IC76-9 IC92-8 IC73-17 IC82-18 IC40-11 IC26-3	IC81-11 PL6-32 IC72-17 IC58-18 IC47-11 IC52-12	IC83-18 IC71-17 IC74-17 IC60-3 IC39-6		SIG A0P0 137954ct
ID0	IC40-2	IC18-18	IC6-2		SIG UUHP 13566ct
ID1	IC40-3	IC18-16	IC6-3		SIG F71A 5552ct
ID2	IC40-4	IC18-14	IC6-4		SIG 1A39 2844ct
ID3	IC40-5	IC81-12	IC6-5		SIG 1089 2826ct
ID4	IC40-6	IC18-3	IC6-6		SIG 2975 1532ct
ID5	IC40-7	IC18-5	IC6-7		SIG 6822 742ct
ID6	IC40-8	IC18-7	IC6-8		SIG 2P19 542ct
ID7	IC40-9	IC18-9	IC6-9		SIG 2F29 450ct
ID8	IC47-2	IC53-18	IC19-2		SIG C80U 282ct
ID9	IC47-3	IC53-16	IC19-3		SIG U9HU 196ct
ID10	IC47-4	IC53-14	IC19-4		SIG 0769 174ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
ID11	IC47-5	IC53-12	IC19-5		SIG FU65 172ct
ID12	IC47-6	IC53-3	IC19-6		SIG 4841 158ct
ID13	IC47-7	IC53-5	IC19-7		SIG 8315 152ct
ID14	IC47-8	IC53-7	IC19-8		SIG 0HU1 280ct
ID15	IC47-9	IC53-9	IC19-9		SIG F626 152ct

2. Memory Ready Characterisation Tables (Issue 1)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Stim	⌜	⌞	⌞	1	28CU
2.	Stimulus	⌞	⌞	⌞	1	d0005 003F

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Stim	SS Stim	IC75-39	Gnd
2.	IC101-4	Clk	IC75-39	Gnd

NOTES:
1. Use these nodes to check the memory ready circuit.
2. Verify 4MHz clock and clock test point frequencies first.
3. Use value 2 for fault finding.
4. Value 2 is LINE DATA function.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
Y001	IC99-5	IC100-2		SIG H015 23610ct	d 0005 000c
Y002	IC100-5	IC101-5		SIG 680A 23610ct	d 0005 0018
Y003	IC101-6	IC100-12		SIG P4U2 48244ct	d 0005 0018
Y004	IC100-8	IC99-1		SIG 9042 23610ct	d 0005 000E
Y005	IC100-9	IC75-3		SIG C8UH 23610ct	d 0005 0031
X005	IC103-13 IC101-4	IC96-5	IC95-5	SIG 3099 12812ct	d 0005 003C

3. Display Characterisation Tables (Issue 1)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Stim	⌐	⌐	⌐	1	2358
2.	Normal	⌐	⌐	-	1	-

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Stim	SS Stim	Clock	Gnd
2.	IC304/6	-	-	IC304/7

NOTES: 1. Measured value 2 is a DELAY measurement to check IC305. (Delay measures microseconds from START on Datapod to STOP on Logic Probe).

2. Ensure that S2, GANG 1 and GANG 2 are OFF for Measured Value 2.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
UD0	IC301-5 SK7-2	IC302-5	SK301-2	SIG FP09	
UD1	IC301-6 SK7-10	IC302-6	SK301-10	SIG C532	
UD2	IC301-10 SK7-3	IC302-10	SK301-3	SIG F75F	
UD3	IC301-12 SK7-11	IC302-12	SK301-11	SIG P248	
UD4	IC301-14 SK7-4	IC302-14	SK301-4	SIG 3HAH	
UD5	IC301-11 SK7-12	IC302-11	SK301-12	SIG 9H95	

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
UD6	IC301-13 SK7-5	IC302-13	SK301-5	SIG 71C8	
X254	IC301-7 SK7-13	IC302-7 IC104-8	SK301-13	SIG 83C8	
A3	IC301-9 SK7-5	IC302-9	SK301-15	SIG 2F1U	
X039	IC301-8 IC101-11	SK301-6 (WDS1-)	SK7-6	SIG C26H 20988ct	
X040	IC302-8 IC101-8	SK301-14 (WDS2-)	SK7-14	SIG 7P06 1020ct	
	IC305-2				(±2.0µd) 2500µd 50Hz
	IC305-1				5000µd 50Hz
	IC305-3				7500µd 50Hz
	IC305-7				10000µd 50Hz
	IC305-11				12500µd 50Hz
	IC305-4				15000µd 50Hz
	IC305-5				17500µd 50Hz
	IC305-10				- 50Hz
	IC305-12				10000µd 50Hz
	IC305-14				2000µd 400Hz

4. Databus Characterisation Tables (Issue 1)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	⌐	¬	¬	1	0003

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clock	Gnd

NOTES: 1. Databus signatures show integrity of stored program, and vary with issue of software. Check issue on labels of IC71 to IC74. When changing ROMS, do not mix different issues.

MEASURED CHARACTERISATION VALUES

	Software Issue				
Node No.	AA	AB	AC	AD	AE
BD0	SIG UA41	SIG 6462	SIG 57H1	SIG F1F6	SIG 5C89
BD1	SIG 4735	SIG F6U0	SIG C376	SIG 3597	SIG CFUH
BD2	SIG 979A	SIG 1P85	SIG 6599	SIG 3490	SIG 9735
BD3	SIG 5AHA	SIG 4U44	SIG CU00	SIG 9972	SIG 1142
BD4	SIG 965C	SIG A335	SIG 8C54	SIG 5072	SIG H381
BD5	SIG 4515	SIG 10H5	SIG 0PP4	SIG C508	SIG AF98
BD6	SIG 894F	SIG A138	SIG 971F	SIG 105F	SIG 15HP
BD7	SIG 0CUU	SIG FHH7	SIG CPUU	SIG 76H8	SIG PPH5

4. Auxiliary Characterisation Tables (Issue 1)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	⌐	⌐	¬	1	0003
2.	Stim	⌐	¬	¬	1	9936

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clock	Gnd
2.	Aux	Aux	Clock	Gnd

NOTES:
1. For Main nodal information, see Section 1.
2. Auxiliary characterisation tables are used when STIMULUS in Section 1 gives wrong Vcc Signature.
3. When tracing faulty nodes back, and signatures are not given here, use FREE RUN in Section 1.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
S/S STIM	IC84-15	TP S/S Stim			SIG 1AF0 2ct
RST-	IC84-1	IC93-12		LOGIC Hi	LOGIC Hi
X026	IC84-11	IC95-10			SIG C500 534ct
UD5	IC84-14	IC79-14		LOGIC Lo	SIG 1U90
A0	IC95-1	IC75-9		SIG UUUU	SIG F3H4
A1	IC95-2	IC75-10		SIG FFFF	SIG 5473
A2	IC95-3	IC75-11		SIG 8484	SIG F400

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X069	IC95-6	IC94-6		LOGIC Lo	SIG 7842
X005	IC95-5	IC103-13		SIG 282A	SIG U557
E-	IC95-4	IC94-2		SIG 0000 131072ct 1MHz±20Hz	SIG 0000 596523ct 963kHz±1kHz
X070	IC94-6			LOGIC Hi	SIG P174 48184ct

This section of Chapter 2 contains the characterisation tables and circuit diagrams pertinent to models of Locator which are modified to Mod. Strike Al state, (see modification plate in the well, facing rear).

The table of contents is listed below.

Section	Title	Page
1.	Main Characterisation Tables	2.37
2.	Memory Ready Tables	2.61
3.	Display Board Tables	2.62
4.	Databus Tables and Software Issue	2.64
5.	Auxiliary Tables	2.65

CHARACTERISATION TABLES, POST MODEL 200218

1. Main Characterisation Tables (Issue 2)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	⌠	⌠	⌡	1	0003
2.	Stimulus	⌠	⌡	⌡	1	2358

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clk	Gnd
2.	SS Stim	SS Stim	Clk	Gnd

NOTES:
1. Check the following clock frequencies are present on the IC pins given: IC27/2 = 10MHz; IC27/11 = 1 MHz; IC27/13 = 2MHz; IC27/14 = 4MHz.
2. Datapod 2 must not be connected.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
A0	IC75-9 IC80-3 IC71-8 IC74-8 IC32-2	IC80-17 IC78-5 IC73-8 IC96-1	PL6-3 IC81-5 IC72-8 IC95-1	SIG UUUU 32768cE	SIG 36HA
A1	IC75-10 IC80-5 IC71-7 IC74-7 IC32-3	IC80-15 IC78-6 IC73-7 IC96-2	PL6-4 IC81-6 IC72-7 IC95-2	SIG FFFF 16384cE	SIG 9F26
A2	IC75-11 IC80-7 IC71-6 IC74-6	IC80-13 IC78-7 IC73-6 IC96-3	PL6-5 IC81-7 IC72-6 IC95-3	SIG 8484 8192cE	SIG 12FU

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
A3	IC75-12 IC80-9 IC71-5 IC74-5	IC80-11 IC78-4 IC73-5	PL6-6 IC81-4 IC72-5	SIG P763 4096cE	SIG 2F1U
A4	IC75-13 IC80-12 IC71-3 IC74-4	IC80-8 IC78-3 IC73-4	PL6-7 IC81-3 IC72-4	SIG 1U5P 2048cE	SIG AA46
A5	IC75-14 IC80-14 IC71-3 IC74-3	IC80-6 IC78-2 IC73-3	PL6-8 IC81-2 IC72-3	SIG 0356 1024cE	SIG 35H6
A6	IC75-15 IC80-16 IC71-2 IC74-2	IC80-4 IC78-17 IC73-2	PL6-9 IC81-1 IC72-2	SIG U759 512cE	SIG 64U9
A7	IC75-15 IC80-16 IC71-1 IC74-1	IC80-2 IC78-17 IC73-1	PL6-10 IC81-17 IC72-1	SIG 6F9A 256cE	SIG FPA9
A8	IC75-17 IC77-3 IC71-23 IC74-23	IC77-17 IC78-16 IC73-23	PL6-11 IC81-16 IC72-23	SIG 7791 128cE	SIG U830
A9	IC75-18 IC77-5 IC71-22 IC74-22	IC77-15 IC78-15 IC73-22	PL6-12 IC81-15 IC72-22	SIG 6321 64cE	SIG 37H2
A10	IC75-19 IC71-19 IC74-19	IC77-13 IC73-19 IC103-1	PL6-13 IC72-19 IC77-7	SIG 37C5 32cE	SIG 1867
A11	IC75-20 IC77-9 SW3-8 IC103-2	IC77-11 SW3-4 SW3-1	PL6-14 SW3-5 IC104-3	SIG 6U28 16cE	SIG F6HA

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
A12	IC75-22 IC77-12	IC77-8 IC102-14	PL6-15 IC103-3	SIG 4FCA 8cE	SIG 8118
A13	IC75-23 IC77-14	IC77-6 IC103-4	PL6-16	SIG 4868 4cE	SIG 421C
A14	IC75-24	IC77-4 IC102-2	PL6-17 IC77-16	SIG 9UP1 2cE	SIG C39U
A15	IC75-25 IC77-18	IC77-2 TP5	PL6-18 IC102-3	SIG 0002 1cE	SIG C39U
X000	IC102-10	SW3-6	SW3-3	SIG 3H3C 2cE	Logic Hi
X001	IC102-9	SW3-2	SW3-7	SIG H785 2cE	SIG 90F7 46138ct
X002	IC102-4	IC103-5		SIG 755H 1cE	SIG C39U 46138ct
X003	IC102-7	IC102-15		SIG PACH 1cE	SIG 90F7 46138ct
X004	IC103-12	IC32-5		SIG 5P1A 1cE	SIG H8CE 1528ct
X005	IC103-13 IC101-4	IC96-5	IC95-5	SIG 282A 1cE	SIG 0374 23610ct
X006	IC103-14	IC104-5		SIG 02H5 1cE	SIG 7983 1032ct
X007	IC103-15	IC105-2		SIG 3APP 1cE	SIG 2358
X008	IC95-12	IC86-11			SIG U8H5 18ct
X009	IC95-13	IC101-9			SIG 7P06 1020ct
X010	IC95-14	IC101-13			SIG C26H 20988ct
X011	IC95-15	IC87-9	IC88-9		SIG 071H 510ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X012	IC96-14	IC83-1	IC83-19	SIG CP01 256c	Logic Hi
X013	IC96-15	IC82-1	IC82-19	SIG U80E 256c	Logic Hi
X014	IC97-6	IC78-8	IC81-8	SIG 02H5 2048cE	SIG 7983 2064ct
X015	IC104-6	IC97-4	IC97-5	SIG 02H6 1cE	SIG 5AHC 1032ct
X016	IC25-11	IC23-10	IC40-19	SIG U1H4 512cE	SIG FF87 254ct
X017	IC25-8	IC23-9	IC47-19	SIG F75H 512cE	SIG H8C0 254ct
X018	IC23-8	IC38-10		SIG 3689 1024cE	SIG 1437 508ct
X019	IC84-16 IC38-13	IC37-11	IC38-12		SIG 8C7U 4ct
X020	IC37-10 IC18-19	IC38-11 IC53-1	IC18-1 IC53-19		SIG A827 4ct
X021	IC24-9	IC38-1			SIG HC79 1298ct
X022	IC38-8	IC19-11	IC6-11	SIG 368A 1024cE	SIG PF16 1806ct
X023	IC24-8	IC25-2	IC25-4		SIG U821 1298ct
X024	IC25-3	IC19-16			SIG 03F9 1552ct
X025	IC25-6	IC6-16			SIG 17UP 1552ct
X026	IC95-10	IC84-11			SIG 0337 532ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X027	IC95-11	IC85-11			SIG CH90 540ct
X028	IC96-12	IC23-5	IC24-1	SIG ACP3 256cE	SIG 8P70 2ct
X029	IC96-13	IC58-1	IC58-19	SIG AU83 256cE	Logic Hi
X030	IC32-7	IC25-12		SIG U1H4 512cE	Logic Hi
X031	IC32-10	IC25-10		SIG F75H 512cE	Logic Hi
X032	IC32-9	IC25-13	IC25-5		SIG FF87 254ct
X033	IC32-11	IC25-9	IC25-1		SIG H8C0 254ct
X034	IC32-15	IC33-9	IC39-9		SIG 3F76 510ct
X035	IC32-14	IC26-1	IC26-19	SIG 75P9 512cE	Logic Hi
X036	IC32-13 IC52-1 IC52-13	IC44-2 IC52-4	IC65-9 IC52-10		SIG H3A1
X037	IC32-12	IC60-1	IC60-19	SIG 1H79 512cE	Logic Hi
X038	IC104-4	IC71-20	IC72-20	SIG 6U2C 16cE	SIG P582
X039	IC101-11	SKT7-6	IC93-2		SIG C26H 20988ct
X040	IC101-8	SKT7-14			SIG 7P06 1020ct
X041	IC65-15 IC29-13	IC46-7 IC33-7	IC34-3 IC39-7		SIG FUFC 2958ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X042	IC46-15	IC29-12	IC33-10		SIG P4H0 296ct
X043	IC65-11	IC60-8	IC30-11		SIG 1121 2990ct
X044	IC65-12	IC60-6			SIG HU5H 5982ct
X045	IC65-13	IC60-4			SIG P45P 11966ct
X046	IC65-14	IC60-2			SIG 0844 23930ct
X047	IC46-14	IC60-11			SIG 70CA 1422ct
X048	IC46-13	IC60-13			SIG P841 742ct
X049	IC46-12	IC60-15			SIG 4835 402ct
X050	IC46-11	IC60-17			SIG C3CA 296ct
X051	IC52-11	IC46-6			SIG 52H3 254ct
X052	IC52-8	IC46-5			SIG FU34 254ct
X053	IC52-6	IC46-4			SIG U91F 254ct
X054	IC52-3	IC46-3			SIG PHC8 254ct
X055	IC23-6	IC24-4			SIG FH6A 6ct
X056	IC29-11	IC24-2			SIG 8287 424ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X057	IC30-13	IC24-12			SIG AA80 1298ct
X058	IC37-12 IC43-4 IC23-2	IC43-10 IC55-12	IC43-11 IC30-9		SIG 2755 128ct
X059	IC54-6 IC23-1	IC9-12 IC24-13	IC34-5 IC108-5		SIG 1U84 6ct
X060	IC23-3	IC23-4	IC30-12		SIG 431A 4ct
X061	IC61-4 IC24-11	IC37-1 IC106-3	IC24-3		SIG UPH1 149087ct
X062	IC24-5 IC51-1	IC17-1 IC5-1	IC12-1		SIG 60F9 322ct
X063	IC33-15	IC39-10			SIG F441 44ct
X064	IC39-15	IC34-4			SIG CF2C 2ct
X065	IC31-7 IC33-2	IC65-2 IC39-2	IC46-2		SIG 3935 91140ct
X066	IC43-6	IC44-1			SIG FFPH 66ct
X067	IC44-3	IC46-9			SIG 6P4F
X068	IC75-34	IC94-5			SIG 856U 25652ct
X069	IC94-6 IC96-4	IC94-9	IC95-6		SIG A637 25652ct
X070	IC94-8 IC81-10 IC40-1	IC76-1 PL6-24 IC47-1	IC78-10 IC32-1		SIG 856U 25652ct
X071	IC33-14 IC26-2	IC19-23	IC6-23		SIG 4987 466ct
X072	IC33-13 IC26-4	IC19-22	IC6-22		SIG 8959 234ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X073	IC33-12 IC26-6	IC19-21	IC6-21		SIG 85C5 116ct
X074	IC33-11 IC26-8	IC19-20	IC6-20		SIG PCFP 58ct
X075	IC39-14 IC26-11	IC19-19	IC6-19		SIG 36H1 28ct
X076	IC39-13 IC26-13	IC19-18	IC6-18		SIG HUA5 14ct
X077	IC39-12 IC26-15	IC19-17	IC6-17		SIG 1450 6ct
X078	IC39-11 IC54-11	IC26-17	IC55-11		SIG PPH7 2ct
X079	IC75-5 IC101-3	IC101-1 PL6-21	IC101-2 IC103-6		SIG 60F0 67658ct
X080	IC87-10	IC91-2			SIG 5550 64ct
X081	IC91-5	IC82-13			SIG 4018
X082	IC91-6	IC105-5			SIG 6340 176ct
X083	IC11-8	IC91-11	IC98-3		SIG 15U2 29ct
X084	IC87-2	IC98-2			SIG 0PA5 254ct
X085	IC98-6	IC105-3			SIG 7547 2ct
X086	IC98-5	IC82-17	IC91-12		SIG 561U 2ct
X087	IC91-9	IC82-11			SIG 79HU 2ct
X088	IC98-9	IC82-15			Logic Lo

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X089	IC98-8	IC105-4			Logic Hi
X090	IC105-6	IC90-9			SIG 1607 177ct
X091	IC90-8	IC75-4			SIG 355U 192ct
NOTE: Switch Clock edge to +ve (∫)					
X092	IC87-7	IC98-12			SIG 9020 128ct
X225	IC88-2	IC89-4			SIG HCA1 256ct
X093	IC88-7	IC89-5			SIG 8HCA 256ct
X094	IC88-10	IC89-12			SIG 86C9 256ct
X095	IC88-15	IC89-13			SIG FH75 256ct
NOTE: Switch Clock edge to -ve (⅂)					
X096	IC89-3	IC97-9	IC98-1		SIG U8U9 256ct
X097	IC89-6	IC97-10	IC98-13		SIG APP2 256ct
X098	IC89-11	IC97-12	IC91-1		SIG A5P1 256ct
X099	IC89-14	IC97-13	IC91-13		SIG PP2H 256ct
X100	IC97-8	IC104-13			SIG A9FH 480ct
X101	IC104-12	IC88-1			SIG 8A95 480ct
X102	IC17-5	IC17-6	IC18-2		SIG 1U03 13334ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X103	IC17-9	IC18-4			SIG 0F40 5476ct
X104	IC17-2	IC18-6			SIG 341F 2690ct
X105	IC17-12	IC12-8	IC18-8		SIG 767A
X106	IC12-5	IC12-6	IC18-17		SIG 5500 1355ct
X107	IC12-9	IC18-15			SIG 1276 687ct
X108	IC12-2	IC18-13			SIG 79P0 292ct
X109	IC12-12	IC51-8	IC18-11		SIG C951 291ct
X110	IC51-5	IC51-6	IC53-2		SIG 691U 158ct
X111	IC51-9	IC53-4			SIG 6P71 203ct
X112	IC51-2	IC53-6			SIG F44A 51ct
X113	IC51-12	IC5-8	IC53-8		SIG P21A 50ct
X114	IC5-5	IC5-6	IC53-17		SIG 9F41 38ct
X115	ICV5-9	IC53-15			SIG 9445 157ct
X116	IC5-2	IC53-13			SIG 0HU1 28ct
X117	IC5-12	IC11-9	IC53-11		SIG 36AA 29ct
X118	IC84-19	IC21-5			SIG P9A7 29ct
X119	IC84-5	IC15-10			SIG 434F 128ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X120	IC84-2 IC13-11	IC15-12	IC43-9		SIG 30U5 256ct
X121	IC84-6 IC48-11	IC34-13 IC35-11	IC41-11 IC107-10		SIG 9HA6 66ct
X122	IC84-9 IC48-10	IC34-1 IC35-10	IC41-10 IC107-9		SIG U7PH 34ct
X123	IC84-12 IC48-9	IC34-2 IC35-9	IC41-9		SIG 72P4 18ct
X124	IC21-6 IC55-1 IC16-1 IC12-13 IC4-1	IC31-2 IC45-1 IC3-1 IC51-13 SKT2-17	IC55-13 IC17-13 IC15-1 IC5-13	IC107-2 IC107-13 IC110-13	SIG P9A7 6ct
X125	IC43-8	PL2-10			SIG 9H89 127ct
X126	IC85-2 IC9-1	IC43-3 IC10-7	IC43-2		SIG AHHA 258ct
X127	IC85-5 IC43-1	IC37-13	IC31-14		SIG 040H 128ct
X128	IC85-6 IC29-2	IC15-2	IC22-11		SIG P6PH 66ct
X129	IC85-16	IC14-12			SIG U53C 4ct
X130	IC85-12 IC41-15 IC48-15	IC66-7 IC34-10	IC41-14 IC48-14		SIG PC4F 24ct
X131	IC85-19	IC14-10	IC13-14		SIG 63U7 2ct
X132	IC85-9	IC66-5	IC2-51		SIG 5P8F 32ct
X133	IC85-15	IC66-10	IC35-14		SIG 44UU 12ct
X134	IC34-12	IC66-11	IC20-9		SIG 3203 18ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X135	IC61-13 IC49-1	IC111-1 IC49-13	IC111-13 IC109-1	IC109-13	SIG HH89 149087ct
X136	IC61-5 IC41-2	IC41-12	IC41-1		SIG 5P92 239ct
X137	IC61-12	IC48-12	IC48-1		SIG 7UC4 33ct
X138	IC37-2	IC15-13	IC9-13		SIG HH89 149087ct
X139	IC15-11	IC30-2			SIG U83C 9597C
X140	IC57-5 IC37-3	IC44-5	IC50-10		SIG P54U 37264ct
X141	IC57-12	IC44-4	IC50-9		SIG F617 37264ct
X142	IC57-13	IC29-1			SIG C610 37262ct
X143	IC57-4 IC2-4	IC37-5 IC45-11	IC2-1		SIG F617 37264ct
X144	IC37-6	IC14-9			SIG P54U 37264ct
X145	IC14-8	IC14-13			SIG U667 2382ct
X146	IC14-11	IC2-2			SIG F88H 1124ct
X147	IC2-3 IC35-1 IC29-5	IC35-12 IC35-3	IC35-15 IC41-4		SIG 0P9A 37267ct
X148	IC86-2	SKT8-4			SIG FUH6 2ct

NOTE: Nodes X149-X154 are not marked on the diagram. They are the lines on IC86 between nodes X148 and X155.

X149	IC86-5	SKT8-5			SIG 6059 2ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X150	IC86-6	SKT8-6			SIG 9CPF 2ct
X151	IC86-9	SKT8-7			SIG CHU3 2ct
X152	IC86-12	SKT8-12			SIG 11C7 2ct
X153	IC86-15	SKT8-13			SIG 39A2 2ct
X154	IC86-16	SKT8-14			SIG 05F7 2ct
X155	IC86-19	SKT8-15			SIG 85F0 2ct
X156	IC22-10	IC29-4	IC36-2		SIG F5C5 66ct
X157	IC29-6	IC29-9			SIG 44CF 29380ct
X158	IC29-3	IC29-10			SIG H5C2 7945ct
X159	IC29-8 IC2-10	IC9-2	IC2-13		SIG 910P 37281ct
X160	IC9-3	IC9-4			SIG F79C 4197ct
X161	IC10-6	IC9-5			SIG F9PF
X162	IC9-6	IC45-2			SIG 0P77 ct
X163	IC41-5	IC108-2			SIG H43U 760ct
X164	IC41-6 IC106-2	IC108-12 IC108-12	IC36-3 IC111-11		SIG U767
X165	IC48-5	IC49-3	IC109-3		SIG 6UCA 1388ct
X166	IC48-6 IC109-11	IC49-11 IC108-8	IC36-11 IC110-11		SIG 4FP2 1388ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X167	IC2-6	IC48-4	IC48-2		SIG 989C 37296ct
X168	IC15-3 IC109-15	IC107-5			SIG 1H4F 4ct
X169					SIG 1H4F 4ct
X170	IC111-7	IC28-2			SIG 691U 4ct
X171	IC111-9	IC49-15	IC38-2		SIG 4A47 4ct
X172	IC49-5	IC49-14			SIG 43FF 4ct
X173	IC49-9	IC38-3	IC28-3		SIG 2A05 4ct
X174	IC36-9	IC38-5	IC22-3		SIG H5A5 4ct
X175	IC36-5	IC38-4			SIG 0H0F 2ct
X176	IC36-6	IC22-5			SIG 2P54 2ct
X177	IC22-6	IC15-4	IC36-13		SIG 0H0F 2ct
X178	IC54-8 IC36-10	IC49-4	IC49-10		SIG 8437 2ct
X179	IC22-4	IC15-5			SIG U6UH 4ct
X180	IC15-6	IC28-6	IC30-8		SIG 7UF6 2ct
X181	IC28-1	IC28-5			SIG 6042 4ct
X182	IC28-4 IC58-2	IC54-5	IC28-12		SIG 3FHF 6ct
X183	IC38-6	IC58-4	IC107-1		SIG 7C97 6ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X184	IC35-6	IC30-3	IC9-9		SIG 63F6 37248ct
X185	IC30-1	IC15-9			SIG 9508 41647ct
X186	IC15-8	IC9-10	IC21-9		SIG C981
X187	IC9-8	IC28-11			SIG 2358
X188	IC28-13	IC17-8			SIG 0000 13316ct
X189	IC9-11 IC3-9	IC45-3 IC4-9	IC16-9 IC31-2		SIG 29HC 127246ct
X190	IC45-6	IC11-1			SIG 5PFC 31884ct
X191	IC45-5	IC16-4			SIG 7H93 31884ct
X192	IC11-2	IC17-4			SIG 7H93 31884ct
X193	IC55-9	IC16-3			SIG 6519 2ct
X194	IC54-10	IC55-3	IC43-5		SIG FH8U 2ct
X195	IC16-5	IC16-6	IC17-10		SIG UCF4 31882ct
X196	IC16-7	IC16-11	IC17-3		SIG 0F62 31882ct
X197	IC16-10	IC16-13	IC17-11		SIG A72F 31880ct
X198	IC16-12	IC16-14	IC12-11		SIG C9F3 31880ct
X199	IC16-15	IC3-4	IC12-10		SIG 346H 31876ct
X200	IC16-2	IC54-9			SIG A76U 2ct
X201	IC3-3	IC11-3			SIG 8137 31876ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X202	IC11-4	IC12-3			SIG 826U 31876ct
X203	IC3-2	IC4-4	IC10-11		SIG A26U 31876ct
X204	IC4-5	IC3-5	IC12-11		SIG 5H66 31874ct
X205	IC3-7	IC4-12	IC10-10		SIG 7497 31874ct
X206	IC4-12	IC3-12	IC51-3		SIG 37U0 31870ct
X207	IC3-10	IC4-3	IC10-9		SIG 4CF7 31870ct
X208	IC4-15	IC5-3	IC3-13		SIG CFHP 31864ct
X209	IC3-15	IC2-9			SIG U4PC 31864ct
X210	IC4-10	IC4-13	IC51-10		SIG 2537 31872ct
X211	IC4-2	IC4-6	IC5-4		SIG 5P4C 31870ct
X212	IC4-7	IC4-14	IC5-10		SIG 0FHA 31868ct
X213	IC3-6	IC11-5			SIG 57FU 31874ct
X214	IC3-11	IC11-13			SIG 698U 31870ct
X215	IC3-14	IC11-11	IC2-12		SIG H7C3 31864ct
X216	IC11-6	IC51-4			SIG 7497 31874ct
X217	IC11-12	IC51-11			SIG 4CF7 31870ct
X218	IC11-10	IC5-11			SIG U4PC 31864ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X219	IC2-8 IC10-14	IC10-4 IC10-13	IC10-1		SIG 65P5
X220	IC2-11 IC10-15	IC10-3 IC10-12	IC10-2		SIG 46CH 45994ct
X221	IC44-6	IC58-5	IC8-2		Line Low unless data is bad
X222	IC20-13	IC44-12			SIG 50HH 74526ct
X223	IC20-12	IC13-2			SIG F617 37264ct
X224	IC20-14	IC13-5			SIG 7844 149055ct

X225 node follows X092 node in the table.

X226	Xtal 1	IC27-2	IC44-9	10MHz ± 200Hz	

NOTES:
1. For readings prefixed with P, select PERIOD/WIDTH, +ve START TRIGGER and +ve STOP TRIGGER.
2. For readings prefixed with W, select PERIOD/WIDTH, +ve START TRIGGER and -ve STOP TRIGGER.

X227	IC27-11 S1-7	IC27-9 IC7-1	S1-2	1MHz W 0.5µs	
X228	IC27-12	IC27-9		2MHz P 0.5µs	W 0.4µs
X229	IC27-13	IC13-6		2MHz P 0.5µs	W 0.2µs
X230	IC27-14 IC100-3	IC75-39 IC99-3	IC100-11	4 MHz	W 0.1µs
X231	IC7-7 R112	IC7-15 PL3-16	IC59-2	100kHz P 10µs	W 2.0µs
X232	IC7-9	SW1-3	IC1-4	10kHz P 100.0µs	W 20µs
X233	IC7-13	IC7-12	IC13-3	50kHz P 20µs	W 10µs

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X234	IC1-3	IC1-15	IC23-13	100Hz P 10000µs	W 5000µs
X235	IC1-13	IC23-12	IC13-10	50Hz P 20000µs	W 10000µs
X236	IC1-9 IC34-9	IC8-11	IC14-1	400Hz P 2500µs	W 500µs
X237	IC1-7	IC1-12	IC28-9	2kHz P 500µs	W 100µs
X238	IC23-11	IC13-13		50Hz P 20000µs	W 15000µs
X239	IC8-8	IC8-12		200Hz P 5000µs	W 2500µs
X240	IC8-9	IC1-1		200Hz P 5000µs	W 2500µs
X241	IC59-12	IC59-9		33333Hz P 30µs	W 20µs
X242	IC59-14	SKT8-3		33333Hz P 30µs	W 10µs
X243	IC59-11	IC59-6		16667Hz P 60µs	W 30µs
X244	IC13-4	IC21-2			SIG F617 37264ct
X245	IC13-9	R110	PL4-20		SIG 30U5 255ct
X246	IC13-7	R103	PL4-16		SIG 7844 149055ct
X247	IC13-12	R107	PL4-14		SIG 63U7 2ct
X248	IC30-4 IC8-3	IC35-4 IC21-12	IC35-2		SIG 7385 74526ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X249	IC21-11	IC31-3	IC21-8		SIG C981
X250	IC21-3 PL4-18	R109 PL3-18	R113		SIG F617 37264ct
X251	IC44-11	IC30-5			SIG 50HH
X252	IC30-10	IC31-15			SIG 7CFC 130ct
X253	IC31-9	IC65-7	IC65-10		SIG 628A 6ct
X254	IC104-8	SKT7-13			SIG 83C8 139758ct
X255	IC107-3	IC106-12	IC110-2		SIG 2P54 2ct
X256	IC108-4	IC110-1	IC106-13		SIG CH02 38ct
X257	IC106-5	IC106-11			SIG 97U8 568ct
X258	IC107-6	IC109-4	IC109-10		SIG 3P14 4ct
X259	IC109-5	IC111-15	IC109-14		SIG 1H4F 4ct
X260	IC108-13	IC111-3			SIG P1U6 878ct
X261	IC108-10	IC108-11			SIG 3A41 1388ct
X262	IC109-9	IC108-9			SIG 1H4F 4ct
X263	IC107-11	IC110-10			SIG 5C19 6ct
X264	IC110-6	IC107-12			SIG 9H19 30ct
X265	IC110-5	IC108-3			SIG CP41 30ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X266	IC106-8	IC107-4	IC106-4		SIG 2H62 16ct
X267	IC107-8	IC108-6			SIG UP18 34ct
X268	IC111-5	IC111-14			SIG 1H4F 4ct
X269	IC108-1	IC110-3			SIG 3857
X270	IC110-9	IC36-1			SIG 7841 6ct

MEASURED CHARACTERISATION VALUES

NOTE: Local bus is D0-D7;
Unidirectional bus is UD0-UD7;
Bi-directional bus is BD0-BD7;
Internal bus is ID0-ID15.

Inter-node Circuit Identification

Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
D0	IC75-33 IC76-18	IC70-1	IC79-17		SIG FP09 ct
D1	IC75-32 IC76-17	IC70-2	IC79-15		SIG C532 ct
D2	IC75-31 IC76-16	IC70-3	IC79-13		SIG F75F 133808ct
D3	IC75-30 IC76-15	IC70-4	IC79-11		SIG P248 ct
D4	IC75-29 IC76-14	IC70-5	IC79-8		SIG 3HAH ct
D5	IC75-28 IC76-13	IC70-6	IC79-6		SIG 9H95 ct
D6	IC75-27 IC76-12	IC70-7	IC79-4		SIG 71C8 ct
D7	IC75-26 IC76-11	IC70-8	IC79-2		SIG A0P0 ct
UD0	IC79-3 IC86-3	IC87-4 IC84-3	SKT7-2 IC85-3		SIG FP09 128394ct
UD1	IC79-5 IC86-4	IC87-5 IC84-4	SK7-10 IC85-4		SIG C532 98508ct
UD2	IC79-7 IC86-7	IC87-12 IC84-7	SKT7-3 IC85-7		SIG F75F 133808ct
UD3	IC79-9 IC86-8	IC87-13 IC84-8	SKT7-11 IC85-8		SIG P248 136698ct
UD4	IC79-12 IC86-13	IC88-4 IC84-13	SKT7-4 IC85-13		SIG 3HAH 131354ct
UD5	IC79-14 IC86-14	IC88-5 IC84-14	SKT7-12 IC85-14		SIG 9H95 87059ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification			Measured Value 1	Measured Value 2
UD6	IC79-16 IC86-17	IC88-12 IC84-17	SKT7-5 IC85-17		SIG 71C8 180746ct
UD7	IC79-18 IC86-18	IC88-13 IC84-18	IC104-9 IC85-18		SIG A0P0 139758ct
BD0	IC76-2 IC92-1 IC73-9 IC82-3 IC40-18 IC26-18	IC78-14 PL6-25 IC72-9 IC58-3 IC47-18 IC65-3	IC83-3 IC71-9 IC74-9 IC60-18 IC33-3		SIG FP09 121346ct
BD1	IC76-3 IC92-2 IC73-10 IC82-5 IC40-17 IC26-16	IC78-13 PL6-26 IC72-10 IC58-5 IC47-17 IC65-4	IC83-5 IC71-10 IC74-10 IC60-16 IC33-4		SIG C532 97214ct
BD2	IC76-4 IC92-3 IC73-11 IC82-7 IC40-16 IC26-14	IC78-12 PL6-27 IC72-11 IC58-7 IC47-16 IC65-5	IC83-7 IC71-11 IC74-11 IC60-14 IC33-5		SIG F75F 132516ct
BD3	IC76-5 IC92-4 IC73-13 IC82-9 IC40-15 IC26-12	IC78-11 PL6-28 IC72-13 IC58-9 IC47-15 IC65-6	IC83-9 IC71-13 IC74-13 IC60-12 IC33-6		SIG P248 115180ct
BD4	IC76-6 IC92-5 IC73-14 IC82-12 IC40-14 IC26-9	IC81-14 PL6-29 IC72-14 IC58-12 IC47-14 IC52-2	IC83-12 IC71-14 IC74-14 IC60-9 IC39-3		SIG 3HAH 128784ct
BD5	IC76-7 IC92-5 IC73-15 IC82-14 IC40-13 IC26-7	IC81-13 PL6-30 IC72-15 IC58-14 IC47-13 IC52-5	IC83-14 IC71-15 IC74-15 IC60-7 IC39-4		SIG 9H95 84489ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
BD6	IC76-8 IC91-7 IC73-16 IC82-16 IC40-12 IC26-5	IC81-12 PL6-31 IC72-16 IC58-16 IC47-12 IC52-9	IC83-16 IC71-16 IC74-16 IC60-5 IC39-5		SIG 71C8 158720ct
BD7	IC76-9 IC92-8 IC73-17 IC82-18 IC40-11 IC26-3	IC81-11 PL6-32 IC72-17 IC58-18 IC47-11 IC52-12	IC83-18 IC71-17 IC74-17 IC60-3 IC39-6		SIG A0P0 137954ct
ID0	IC40-2	IC18-18	IC6-2		SIG UUHP 13566ct
ID1	IC40-3	IC18-16	IC6-3		SIG F71A 5680ct
ID2	IC40-4	IC18-14	IC6-4		SIG 1A39 2852ct
ID3	IC40-5	IC81-12	IC6-5		SIG 1089 2830ct
ID4	IC40-6	IC18-3	IC6-6		SIG 2975 1534ct
ID5	IC40-7	IC18-5	IC6-7		SIG 6822 742ct
ID6	IC40-8	IC18-7	IC6-8		SIG 2P19 546ct
ID7	IC40-9	IC18-9	IC6-9		SIG 2F29 456ct
ID8	IC47-2	IC53-18	IC19-2		SIG C80U 282ct
ID9	IC47-3	IC53-16	IC19-3		SIG U9HU 196ct
ID10	IC47-4	IC53-14	IC19-4		SIG 0769 177ct

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
ID11	IC47-5	IC53-12	IC19-5		SIG FU65 177ct
ID12	IC47-6	IC53-3	IC19-6		SIG 4841 164ct
ID13	IC47-7	IC53-5	IC19-7		SIG 8315
ID14	IC47-8	IC53-7	IC19-8		SIG 0HU1 282ct
ID15	IC47-9	IC53-9	IC19-9		SIG F626 157ct

2. Memory Ready Characterisation Tables (Issue 2)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Stim	⌠	⌊	⌊	1	28CU
2.	Stim	⌊	⌊	⌊	1	d0005 003F

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Stim	SS Stim	IC75-39	Gnd
2.	IC101-4	Clk	IC75-39	Gnd

NOTES:
1. Use these nodes to check the memory ready circuit.
2. Verify 4MHz clock and clock test point frequencies first.
3. Use value 2 for fault finding.
4. Value 2 is LINE DATA function.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
Y001	IC99-5	IC100-2		SIG H015 23610ct	d 0005 000c
Y002	IC100-5	IC101-5		SIG 680A 23610ct	d 0005 0018
Y003	IC101-6	IC100-12		SIG P4U2 48244ct	d 0005 0018
Y004	IC100-8	IC99-1		SIG 9042 23610ct	d 0005 000E
Y005	IC100-9	IC75-3		SIG C8UH 23610ct	d 0005 0031
X005	IC103-13 IC101-4	IC96-5	IC95-5	SIG 3099 12812ct	d 0005 003C

3. Display Characterisation Tables (Issue 2)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Stim	∫	⌈	⌈	1	2358
2.	Normal	∫	⌈	–	1	-

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Stim	SS Stim	Clock	Gnd
2.	IC304/6	-	-	IC304/7

NOTES: 1. Measured value 2 is a DELAY measurement to check IC305. (Delay measures microseconds from START on Datapod to STOP on Logic Probe).

2. Ensure that S2, GANG 1 and GANG 2 are OFF for Measured Value 2.

MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
UD0	IC301-5 SK7-2	IC302-5	SK301-2	SIG FP09	
UD1	IC301-6 SK7-10	IC302-6	SK301-10	SIG C352	
UD2	IC301-10 SK7-3	IC302-10	SK301-3	SIG F75F	
UD3	IC301-12 SK7-11	IC302-12	SK301-11	SIG P248	
UD4	IC301-14 SK7-4	IC302-14	SK301-4	SIG 3HAH	
UD5	IC301-11 SK7-12	IC302-11	SK301-12	SIG 9H95	

MEASURED CHARACTERISATION VALUES

Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
UD6	IC301-13 SK7-5	IC302-13	SK301-5	SIG 71C8	
X254	IC301-7 SK7-13	IC302-7 IC104-8	SK301-13	SIG 83C8	
A3	IC301-9 SK7-5	IC302-9	SK301-15	SIG 2F1U	
X039	IC301-8 IC101-11	SK301-6 (WDS1-)	SK7-6	SIG C26H 20988ct	
X040	IC302-8 IC101-8	SK301-14 (WDS2-)	SK7-14	SIG 7P06 1020ct	
	IC305-2				(±2.0µd) 2500µd 50Hz
	IC305-1				5000µd 50Hz
	IC305-3				7500µd 50Hz
	IC305-7				10000µd 50Hz
	IC305-11				12500µd 50Hz
	IC305-4				15000µd 50Hz
	IC305-5				17500µd 50Hz
	IC305-10				- 50Hz
	IC305-12				10000µd 50Hz
	IC305-14				2000µd 400Hz

4. Databus Characterisation Tables (Issue 2)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	⌈	⌊	⌊	1	0001

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clock	Gnd

NOTES: 1. Databus signatures show integrity of stored program, and vary with issue of software. Check issue on labels of IC71 to IC74. When changing ROMS, do not mix different issues.

MEASURED CHARACTERISATION VALUES

	Software Issue				
Node No.	AA	AB	AC	AD	AE
BD0	SIG UA41	SIG 6462	SIG 57H1	SIG F1F6	SIG 5C89
BD1	SIG 4735	SIG F6U0	SIG C376	SIG 3597	SIG CFUH
BD2	SIG 979A	SIG 1P85	SIG 6599	SIG 3490	SIG 9735
BD3	SIG 5AHA	SIG 4U44	SIG CU00	SIG 9972	SIG 1142
BD4	SIG 965C	SIG A335	SIG 8C54	SIG 5072	SIG H381
BD5	SIG 4515	SIG 10H5	SIG 0PP4	SIG C508	SIG AF98
BD6	SIG 894F	SIG A138	SIG 971F	SIG 105F	SIG 15HP
BD7	SIG 0CUU	SIG FHH7	SIG CPUU	SIG 76H8	SIG PPH5

4. Auxiliary Characterisation Tables (Issue 2)

Measurement Set-up Requirements:

MEASUREMENT		LOCATOR BUTTONS				Vcc CHECK
Value No.	Test Mode	Start	Stop	Clock	Mode	Signature
1.	Free Run	∫	∫	⅂	1	0003
2.	Stim	∫	⅂	⅂	1	9936

	DATAPOD CONNECTIONS			
Value No.	Start Circuit ID	Stop Circuit ID	Clock Circuit ID	Ground Circuit ID
1.	SS Free	SS Free	Clk	Gnd
1.	Aux	Aux	Clk	Gnd

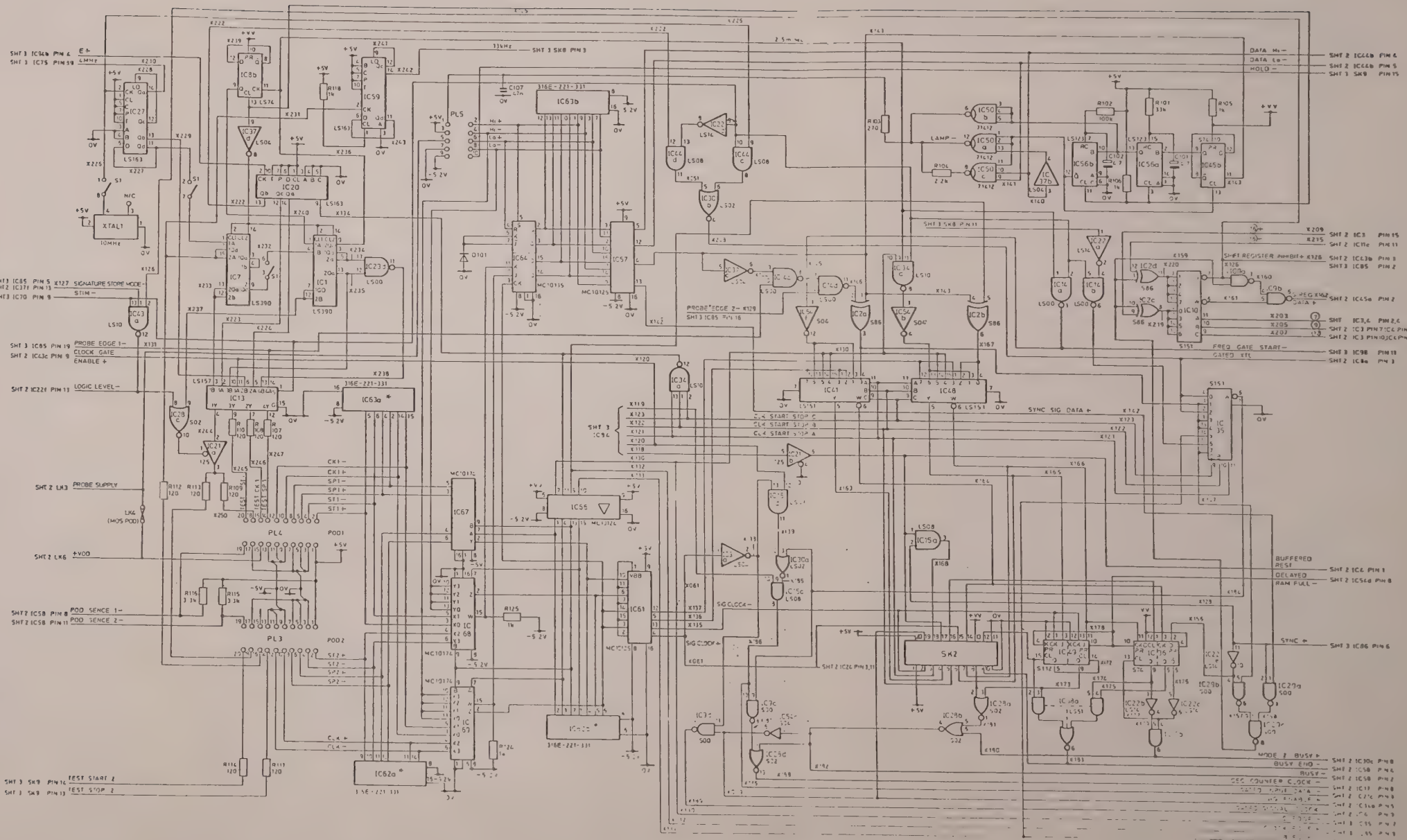
NOTES:
1. For Main nodal information, see Section 1.
2. Auxiliary characterisation tables are used when STIMULUS in Section 1 gives wrong Vcc Signature.
3. When tracing faulty nodes back, and signatures are not given here, use FREE RUN in Section 1.

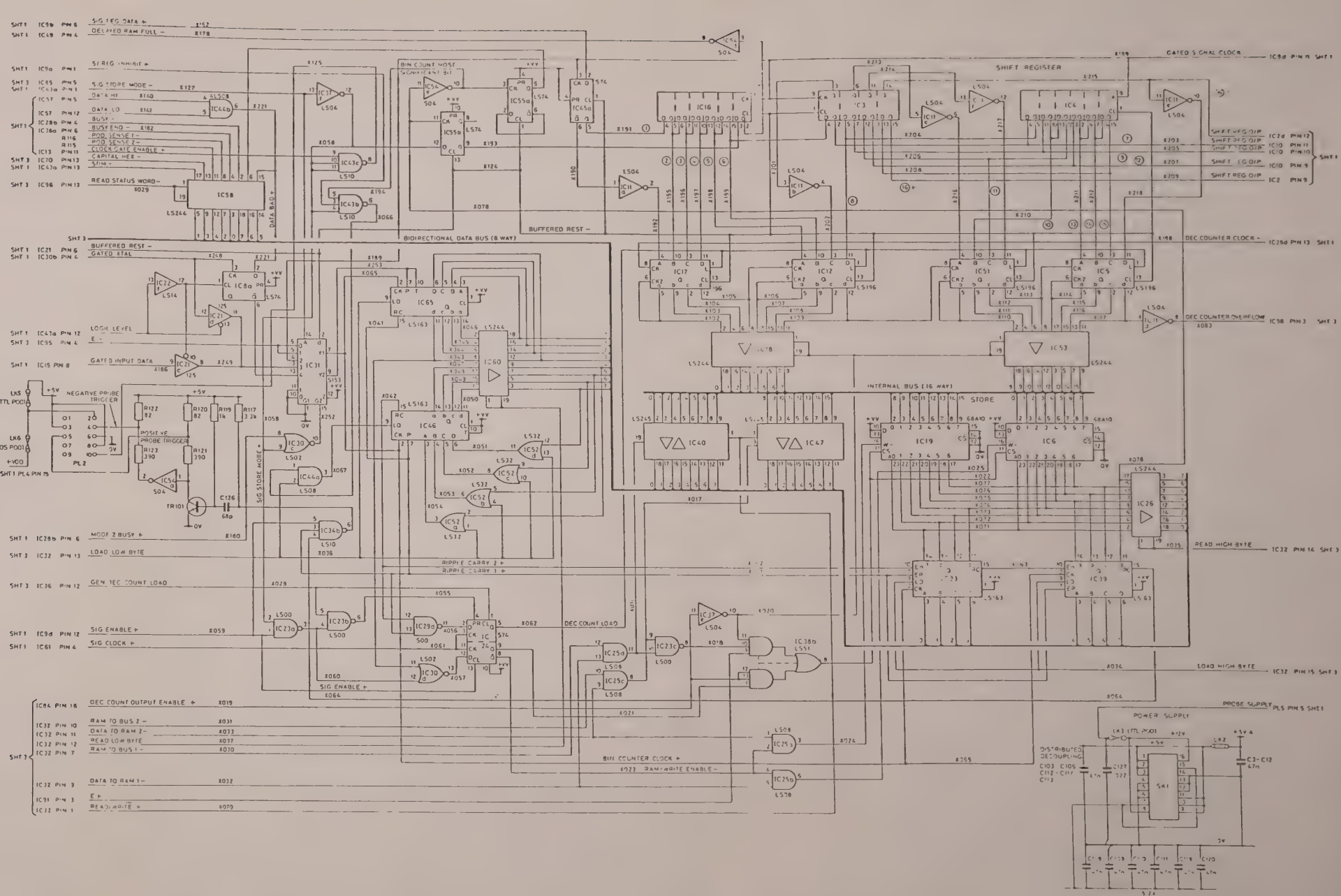
MEASURED CHARACTERISATION VALUES

	Inter-node Circuit Identification				
Node No.	Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
S/S STIM	IC84-15	TP S/S Stim			SIG 1AF0 2ct
RST-	IC84-1	IC93-12		LOGIC Hi	LOGIC Hi
X026	IC84-11	IC95-10			SIG C500 534ct
UD5	IC84-14	IC79-14		LOGIC Lo	SIG 1U90
A0	IC95-1	IC75-9		SIG UUUU	SIG F3H4
A1	IC95-2	IC75-10		SIG FFFF	SIG 5473
A2	IC95-3	IC75-11		SIG 8484	SIG F400

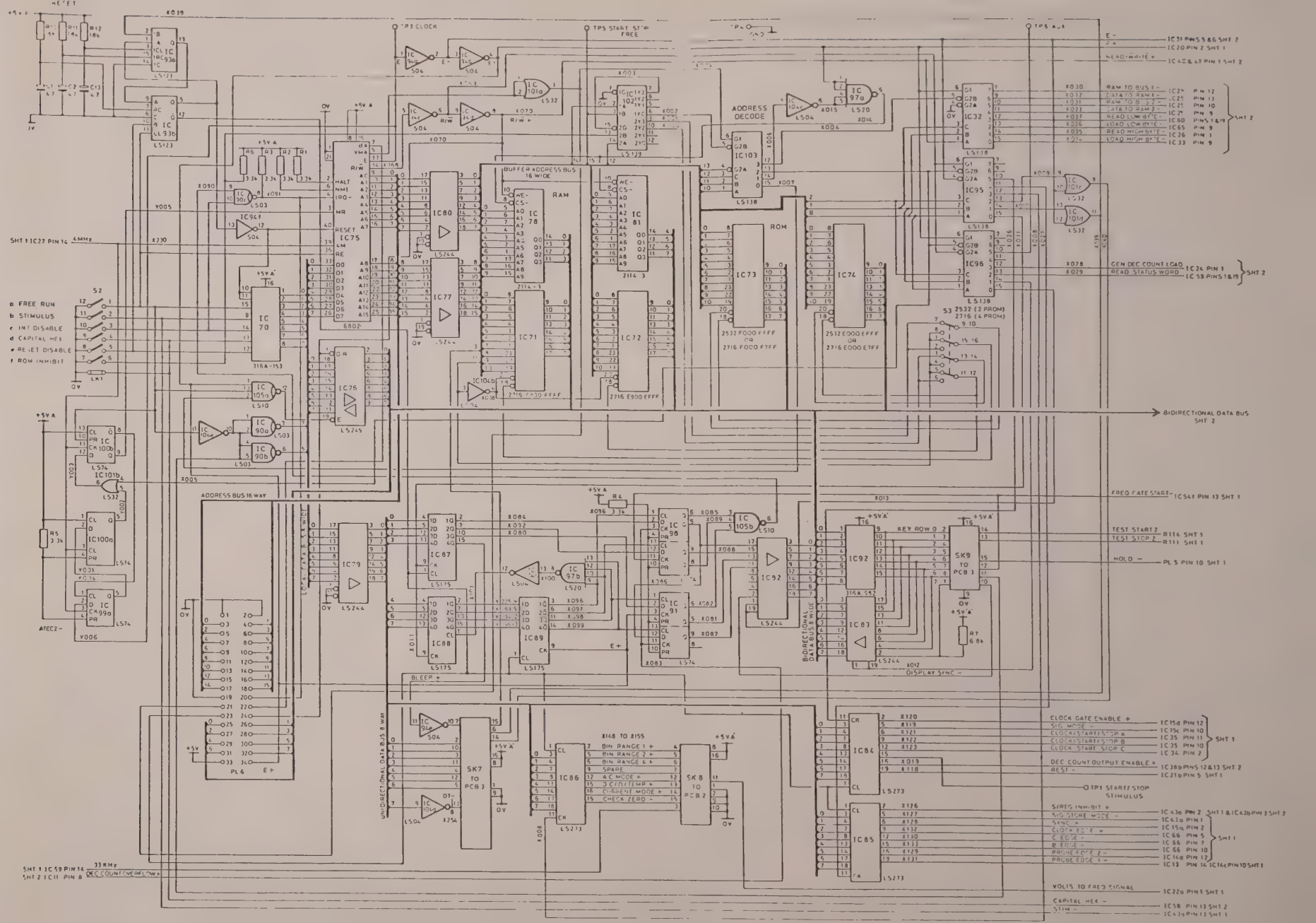
MEASURED CHARACTERISATION VALUES

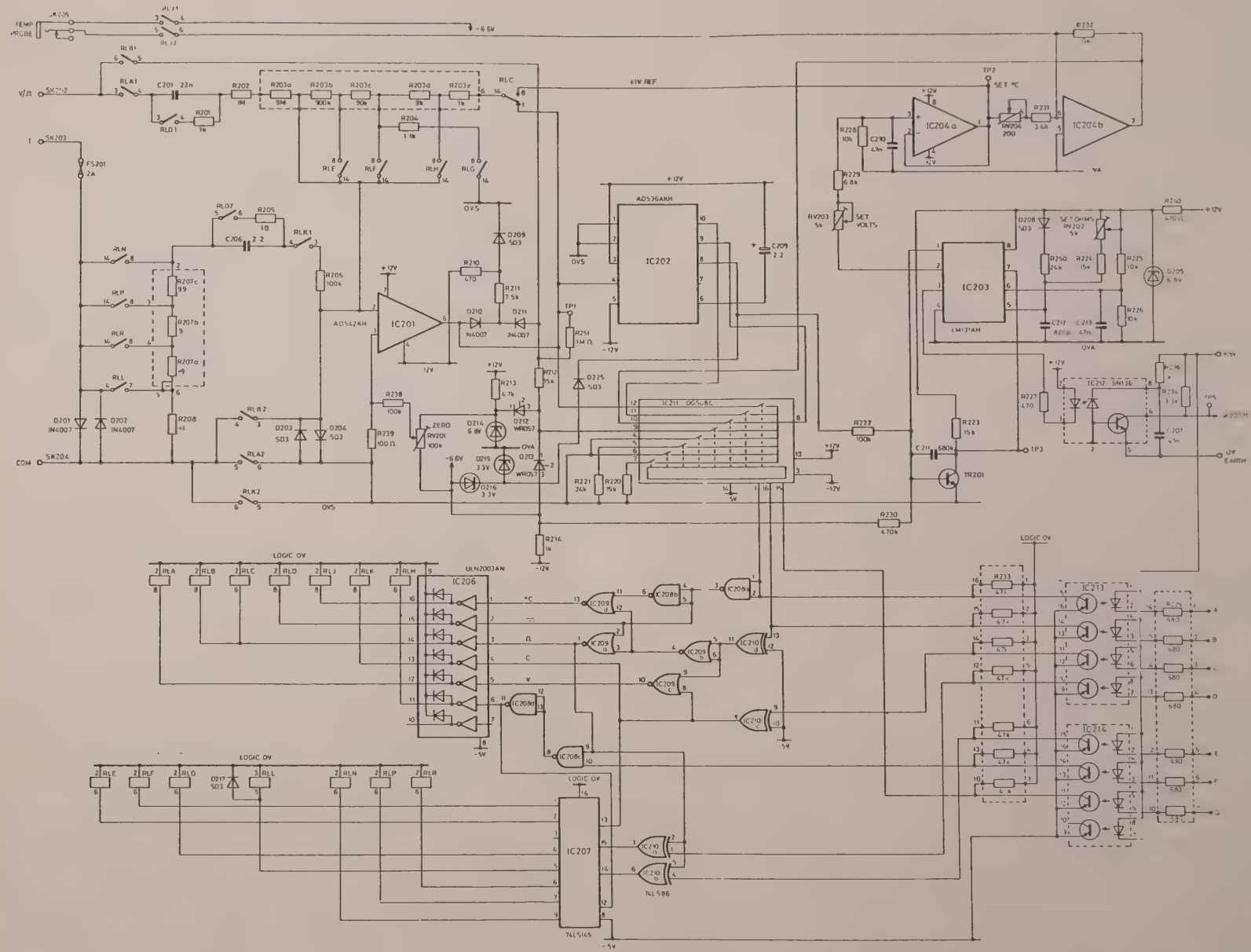
Node No.	Inter-node Circuit Identification Circuit ID	Circuit ID	Circuit ID	Measured Value 1	Measured Value 2
X069	IC95-6	IC94-6		LOGIC Lo	SIG 7842
X005	IC95-5	IC103-13		SIG 282A	SIG U557
E-	IC95-4	IC94-2		SIG 0000 131072ct 1MHz±20Hz	SIG 0000 596523ct 963kHz±1kHz
X070	IC94-6			LOGIC Hi	SIG P174 48184ct



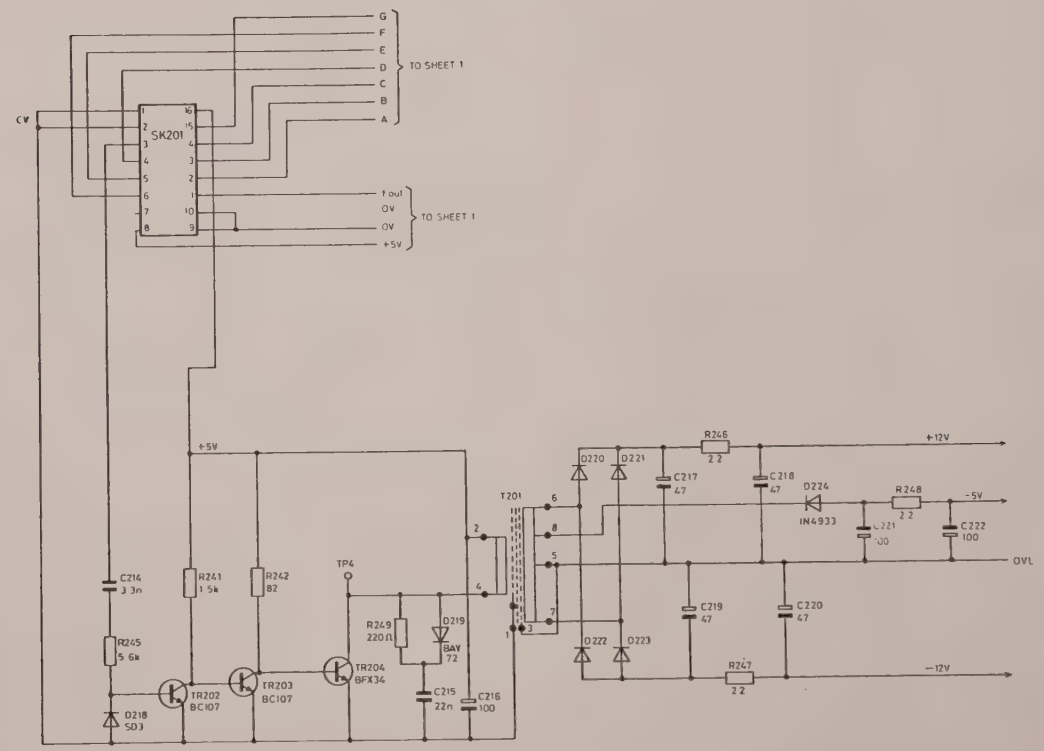


Main Logic Board (pcb 1, Sheet 2, Issue 2) 2.59


RESET
TP3 CLOCK
TP5 START STOP FREE
ADDRESS DECODE
ROM
RAM
BUFFER ADDRESS BUS 16 WIDE
2532 (2 PROM) 2716 (4 PROM)
S2
a FREE RUN
b STIMULUS
c INT DISABLE
d CAPITAL HEX
e RE-JET DISABLE
f ROM INHIBIT
BIDIRECTIONAL DATA BUS SHT 2
ADDRESS BUS 16 WAY
UNIDIRECTIONAL DATA BUS 8 WAY
BIDIRECTIONAL DATA BUS 8 WAY
KEY ROW 0
DISPLAY SYNC
BLEEP
HOLD
TEST START 2
TEST STOP 2
FREQ GATE START
CLOCK GATE ENABLE
DEC COUNT OUTPUT ENABLE
TP1 START/STOP STIMULUS
VOLTS TO FREQ SIGNAL
CAPITAL HEX
STIM
SK7 TO PCB 3
SK8 TO PCB 2
SK9 TO PCB 3
PL 6
PL 5 PIN 10 SHT 1

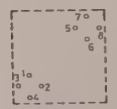


Multimeter Section (pcb 2, Sheet 1) 2.73

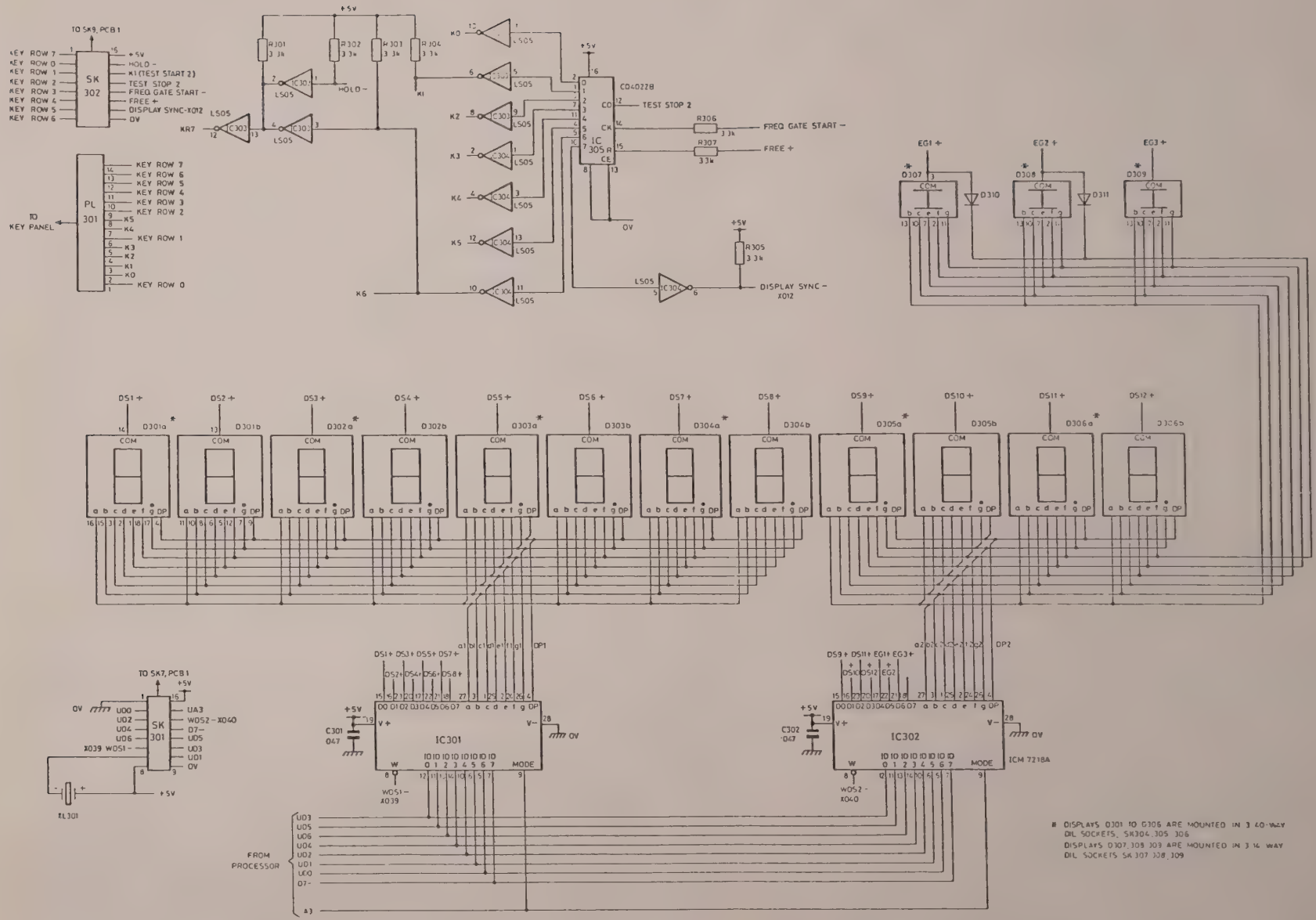


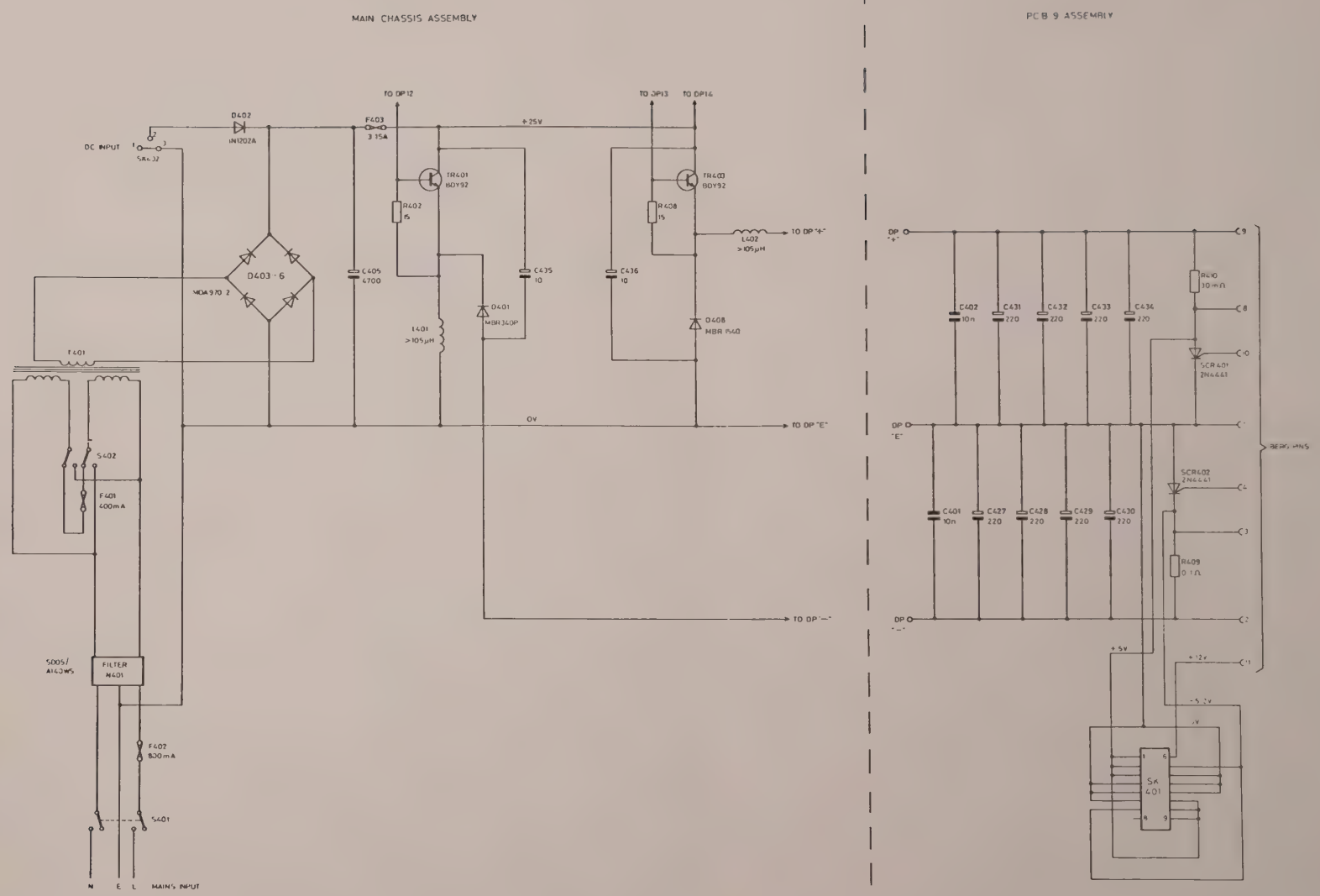
A	B	C	MODE	RELAYS
0	0	0	0V	RLA RLD
1	0	0	AV	RLA
0	1	0	°C	RLJ
1	1	0	Ω	RLB RLC
0	0	1	DC	RLK RLD
1	0	1	AC	RLK

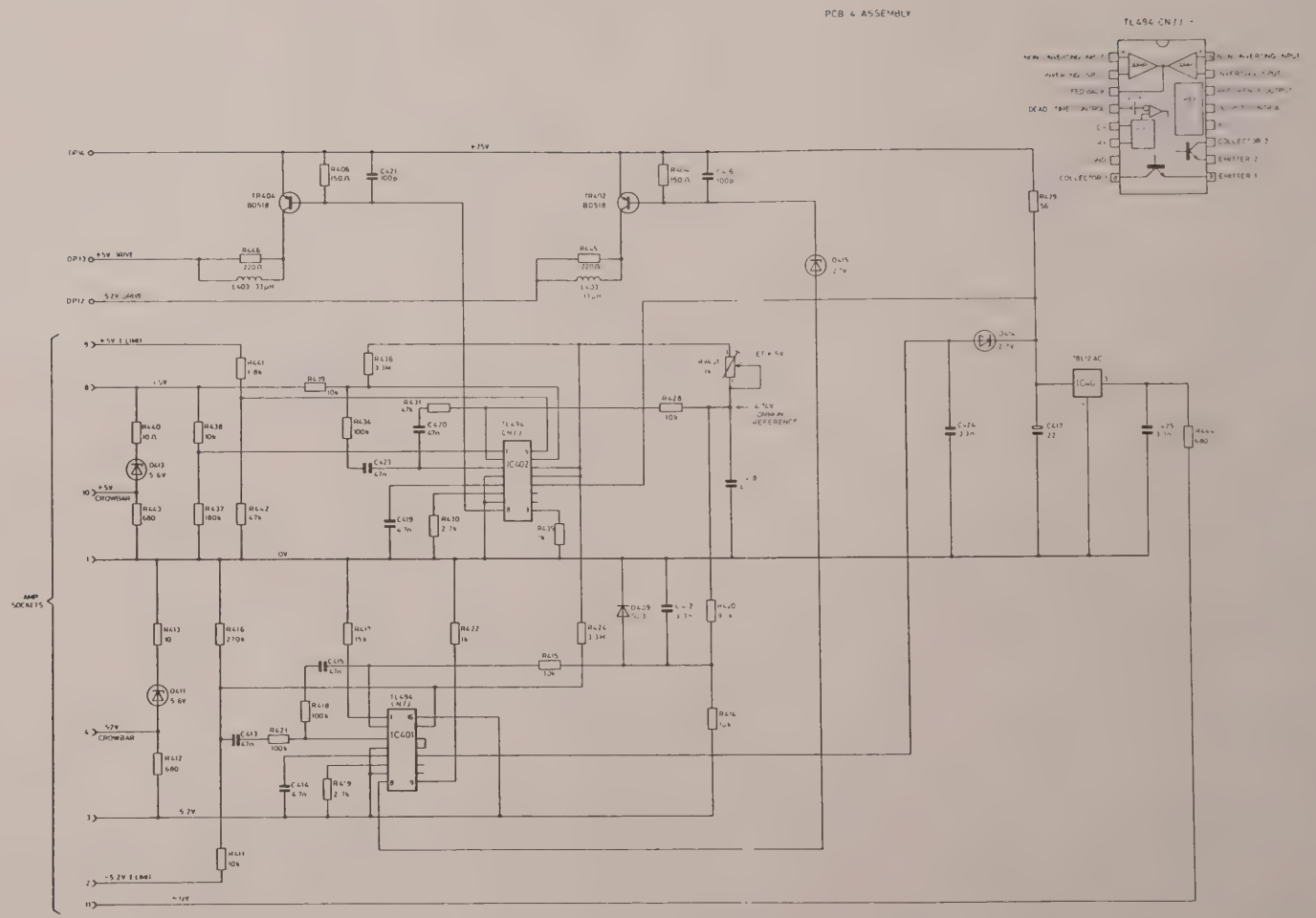
RANGE	D	E	F	VOLTS		AMPS		OHMS	
0	0	0	0	1000	RLF	2	RLL	20000000	RLG
1	1	0	0	200	RLE	2	RLR	2000000	-
2	0	1	0	20	-	02	RLP	200000	RLE
3	1	1	0	2	RLG	002	RLN	20000	RLF
4	0	0	1	———		———		2000	RLH

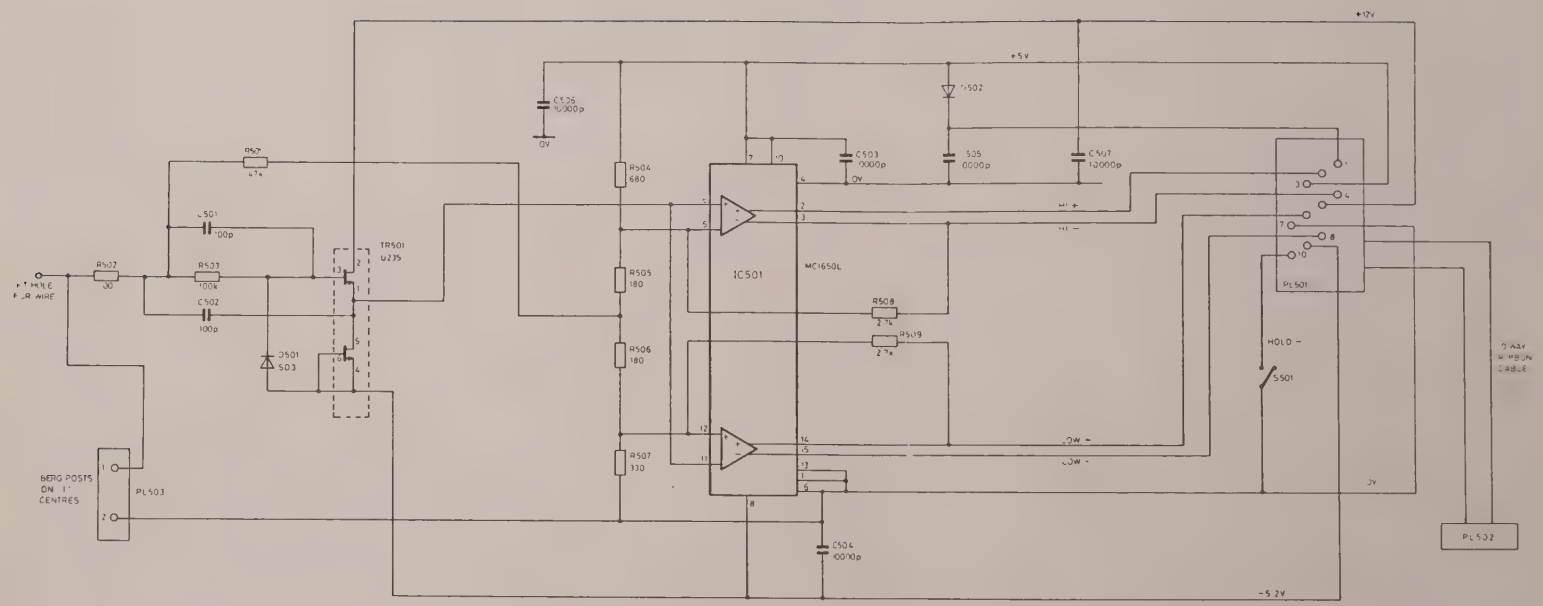


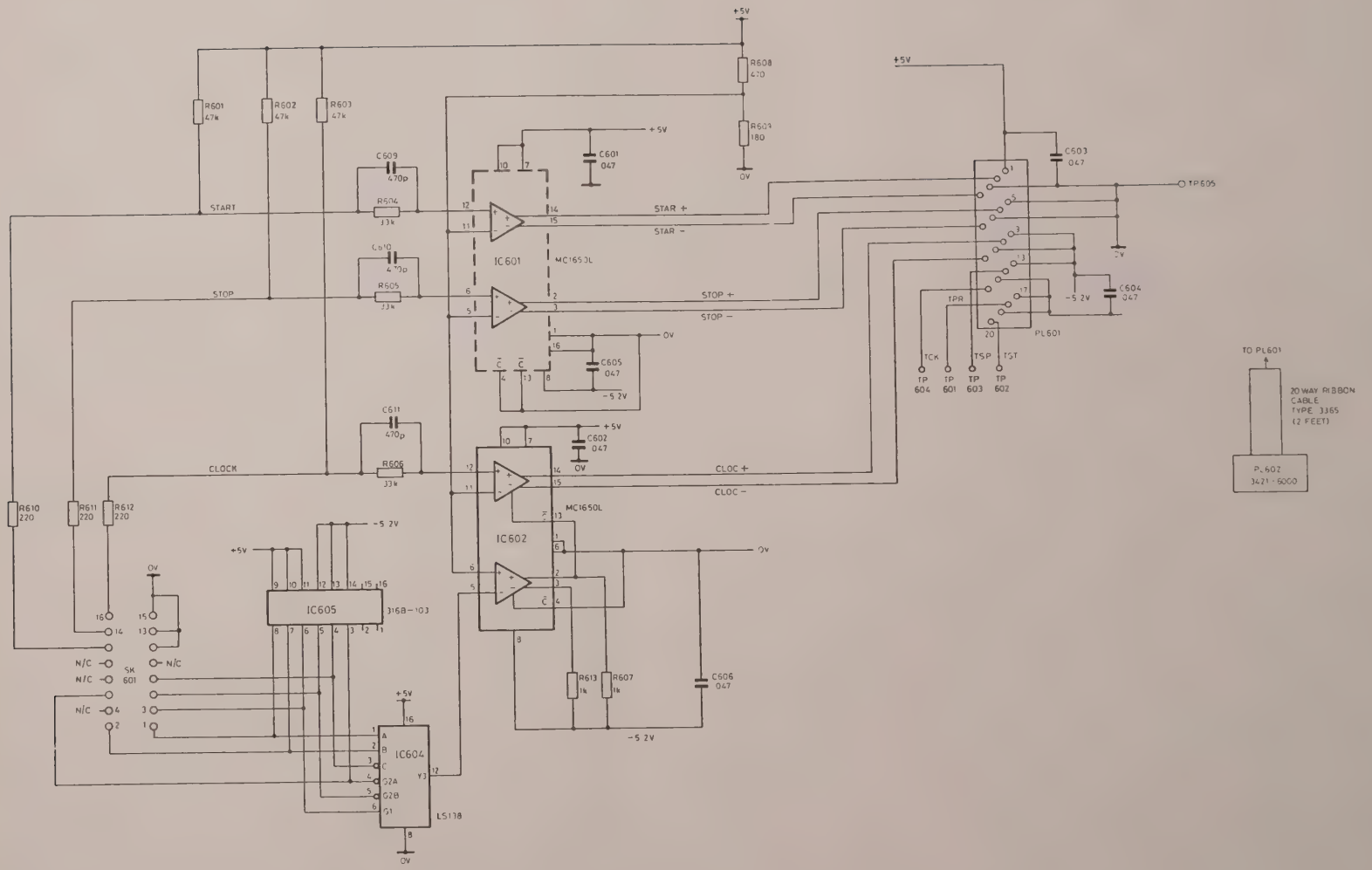
T201 PIN LAYOUT
(TOP VIEW)


TO SK9, PCB 1
SK 302
KEY ROW 7
KEY ROW 0
KEY ROW 1
KEY ROW 2
KEY ROW 3
KEY ROW 4
KEY ROW 5
KEY ROW 6
+5V
HOLD –
K1 (TEST START 2)
TEST STOP 2
FREQ GATE START –
FREE +
DISPLAY SYNC-X012
0V
PL 301
TO KEY PANEL
K5
K4
K3
K2
K1
K0
R301 3.3k
R302 3.3k
R303 3.3k
R304 3.3k
IC303
IC304
IC305
IC306
LS05
KR7
K0
K2
K3
K4
K5
K6
K7
IC 305 A
CD4022B
CO
CK
CE
TEST STOP 2
R306 3.3k
FREQ GATE START –
R307 3.3k
FREE +
R305 3.3k
DISPLAY SYNC – X012
EG1 +
EG2 +
EG3 +
D307
D308
D309
D310
D311
COM
DS1 +
DS2 +
DS3 +
DS4 +
DS5 +
DS6 +
DS7 +
DS8 +
DS9 +
DS10 +
DS11 +
DS12 +
D301a *
D301b
D302a *
D302b
D303a *
D303b
D304a *
D304b
D305a *
D305b
D306a *
D306b
a b c d e f g DP
TO SK7, PCB 1
SK 301
UD0
UD2
UD4
UD6
X039 WOS1 –
UA3
WOS2 – X040
D7 –
UD5
UD3
UD1
RL301
C301 .047
C302 .047
IC301
IC302
ICM 7218A
MODE
WOS1 – X039
WOS2 – X040
DP1
DP2
FROM PROCESSOR
DISPLAYS D301 TO D306 ARE MOUNTED IN 3 40-WAY DIL SOCKETS, SK304, 305, 306
DISPLAYS D307, 308, 309 ARE MOUNTED IN 3 14 WAY DIL SOCKETS SK 307, 308, 309

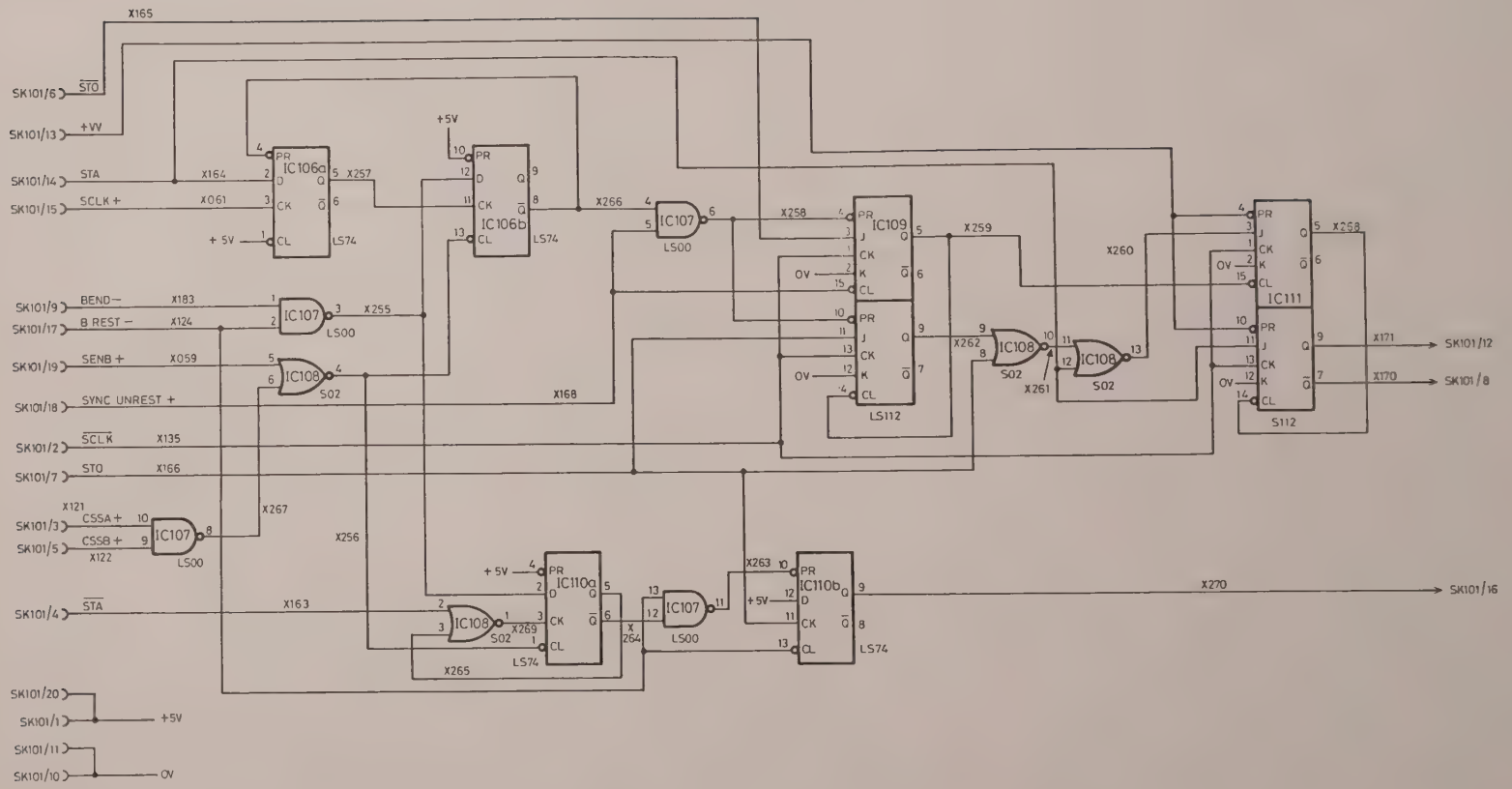

MAIN CHASSIS ASSEMBLY
PCB 9 ASSEMBLY
TO DP12
TO DP13
TO DP16
D402
IN1202A
F403
3 15A
+25V
DC INPUT
SR432
TR401
BDY92
TR400
BDY92
R402
15
R408
15
TO DP "+"
L402
>105µH
D403-6
WOA970 2
C405
4700
C435
10
C436
10
D401
MBR340P
D408
MBR 1540
L401
>105µH
T401
0V
TO DP "E"
S402
F401
400mA
TO DP "-"
SOOS/
A140WS
FILTER
N401
F402
630mA
S401
N E L MAIN'S INPUT
DP "+"
DP "E"
DP "-"
C402
10n
C431
220
C432
220
C433
220
C434
220
R410
10mΩ
SCR401
2N4441
SCR402
2N4441
C401
10n
C427
220
C428
220
C429
220
C430
220
R409
0.1Ω
BEAD PINS
+5V
+12V
-5.2V
SK
401

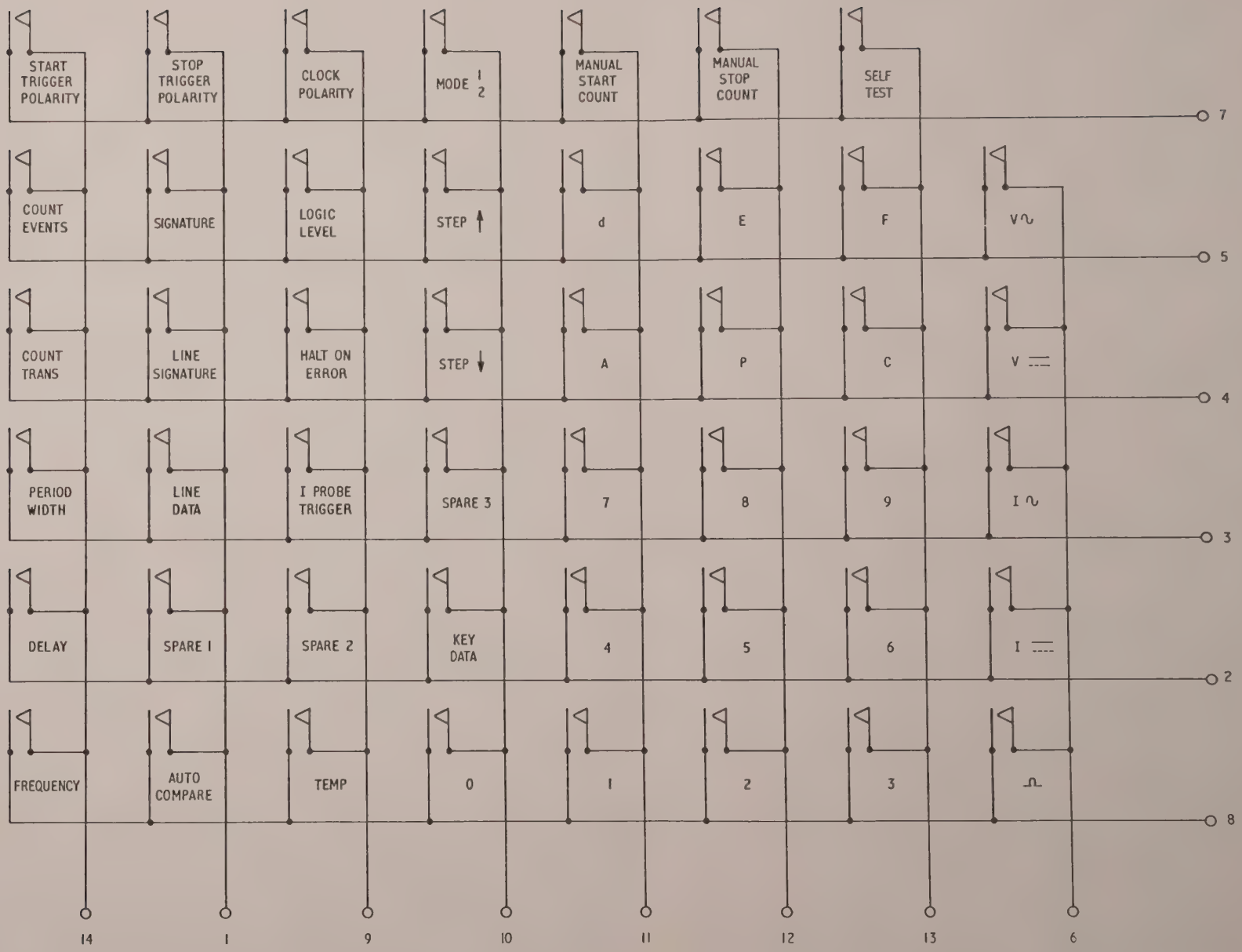

PCB 4 ASSEMBLY
TL494 CN/J -
+75V
TR404 BD518
TR407 BD518
R406 150Ω
C421 100p
R439 56
D419 2.7V
DP14
DP13 +5V WAVE
DP12 -5V WAVE
R445 220Ω
L403 33μH
9 +5V I LIMIT
8 +5V
7
6
5
4 -5V CROWBAR
3
2 -5V I LIMIT
11
AMP SOCKETS
R461 1.8k
R439 10k
R436 3.3M
R431 47k
C420 47n
R434 100k
C423 47n
R440 10Ω
R438 10k
R463 680
R437 180k
R442 47k
D413 5.6V
+5V CROWBAR
C419 4.7n
R610 2.7k
R435 1k
IC402
TL494 CN/J
R428 10k
RV401 1k
4.75V COMMON REFERENCE
D414 2.7V
7812AC
IC406
C424 33n
C417 22
C425 33n
R444 680
0V
R433 10
R416 270Ω
R617 15k
R422 1k
R426 3.3M
D409 5.6V
C422 33n
R440 9.1k
R615 10k
C415 47n
D411 5.6V
R618 100k
IC401
TL494 CN/J
R421 100k
C413 47n
C416 47n
R619 2.7k
R416 10k
-5V
+5V


+12V
+5V
C506
0.300p
0V
D502
R504
680
C503
.01000p
0V
C505
.0005p
C507
.01000p
R507
470
C501
100p
R501
100k
C502
100p
R502
100
TR501
U235
D501
S03
R505
180
R506
180
R507
330
IC501
MC1650L
R508
2.7k
R509
2.7k
HOLD -
S501
PL501
PL502
PL503
BERG POSTS
ON .1"
CENTRES
-5.2V



Pod Schematic (pcb 6) 2.85


X165
SK101/6
STO
SK101/13
+VV
SK101/14
STA
SK101/15
SCLK +
X164
X061
+ 5V
IC106a
IC106b
LS74
X257
+5V
X266
IC107
LS00
X258
IC109
LS112
X259
X260
IC111
S112
X268
X171
SK101/12
X170
SK101/8
SK101/9
BEND —
X183
SK101/17
B REST —
X124
IC107
LS00
X255
SK101/19
SENB +
X059
IC108
S02
SK101/18
SYNC UNREST +
X168
SK101/2
SCLK
X135
SK101/7
STO
X166
X121
SK101/3
CSSA +
SK101/5
CSSB +
X122
IC107
LS00
X267
X256
SK101/4
STA
X163
IC108
S02
X269
IC110a
LS74
X265
X263
IC110b
LS74
X264
IC107
LS00
X270
SK101/16
X262
X261
IC108
S02
IC108
S02
SK101/20
SK101/1
+5V
SK101/11
SK101/10
0V


START TRIGGER POLARITY
STOP TRIGGER POLARITY
CLOCK POLARITY
MODE 1 2
MANUAL START COUNT
MANUAL STOP COUNT
SELF TEST
COUNT EVENTS
SIGNATURE
LOGIC LEVEL
STEP ↑
d
E
F
V∿
COUNT TRANS
LINE SIGNATURE
HALT ON ERROR
STEP ↓
A
P
C
V ⎓
PERIOD WIDTH
LINE DATA
I PROBE TRIGGER
SPARE 3
7
8
9
I ∿
DELAY
SPARE 1
SPARE 2
KEY DATA
4
5
6
I ⎓
FREQUENCY
AUTO COMPARE
TEMP
0
1
2
3
7
5
4
3
2
8
14
1
9
10
11
12
13
6

INTRODUCTION

This chapter provides a comprehensive series of performance and calibration checks to be completed following a repair. Calibration checking is not normally necessary. However, following a component replacement, the calibration must be checked to ensure that Locator is working to its maximum frequency.

The chapter is divided into two sub-sections as follows:-

Performance Checks
These are a method of checking the delay times, and can be carried out with Locator in its normal assembled state.

Calibration Checks
The calibration of the DMM must be completed wth the top of the instrument removed to one side. These final adjustments which must be carried out at an ambient temperature of 250°C ± 5°C, provide a degree of performance which meets the specification figures given in Chapter 4 of this manual.

PERFORMANCE CHECKS

TEST EQUIPMENT

The Test Equipment listed below should be available to carry out setting-up procedures, and must have an accuracy-uncertainty equal to or better than that shown in the calibration tables.

a) Lyons Pulse Generator PG73N.

b) Hewlett-Packard Pulse Generator 1900A, with variable transition time module 1915A.

c) Tektronix Oscilloscope 475 with 2 x 10 probes of equal length having 2 ¾inch earth chips.

d) 3 BNC-BNC 50 Ω coaxial leads of equal length (Approx. 2 feet is suitable).

e) 1MHz frequency standard.

f) 7201 Input Delay Test Box (72016001), or 50Ω BNC socket and 50 Ω terminator.

g) 16-pin "DIP CLIP".

h) Multimeter e.g. Locator or 7045, which must be able to measure up to 2V ± 10mV, and 30µA ± 1µA.

SAFETY

THE INSTRUMENT SHOULD BE DISCONNECTED FROM THE MAINS SUPPLY BEFORE ANY ATTEMPT IS MADE TO REMOVE THE TOP COVER. BEWARE OF MAINS POTENTIAL ON THE POWER SUPPLY WHEN THE TOP COVER IS REMOVED.

DIGITAL SYSTEM TEST

This specification covers the testing of PCB 1, Logic Probe and Pod 1 at high frequency. It is assumed that the instrument has passed its SELF TEST.

FREQUENCY ACCURACY

Connect the Logic probe to the Frequency Standard. Select FREQUENCY on the Locator keyboard and check tht the reading is 1000000 ± 10. Adjustment is available on XTAL 1 through a hole in the back of the metal can.

DO NOT ADJUST UNLESS OUT OF SPECIFICATION

SETTING UP PROCEDURE

1. Set the PG73 controls as follows:

OUTPUT A	to	NORM.
OUTPUT B	to	NORM.
PERIOD	to	0.4µs
A DELAY	to	80ns
A WIDTH	to	0.2µs
B DELAY	to	minimum
B WIDTH	to	0.2µs
A HEIGHT	to	+3V
B HEIGHT	to	+3V

Connect BNC-BNC leads between:

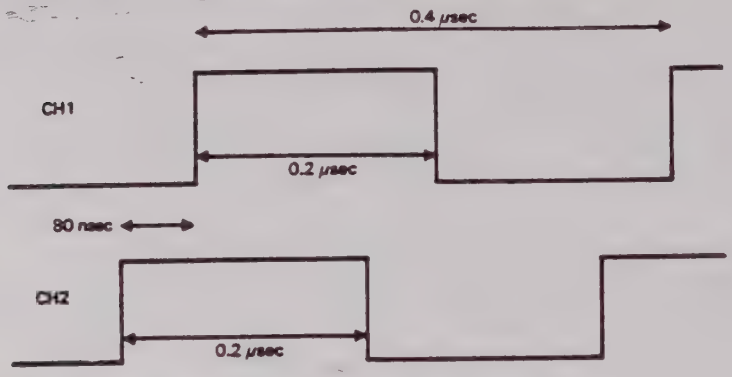
OUTPUT A and SK1, Test box
OUTPUT B and SK2, Test box
SYNC OUT and oscilloscope external trigger

Set the oscilloscope controls as follows:

External trigger, positive slope.
0.1µs/cm timebase
1V/cm vertical deflection on channel 1 (CH1) and channel 2 (CH2).
Alternate sweep.

Connect CH1 to TP8 of the 7201 Input Delay Test Box, and CH2 to TP9.

The following waveforms should be seen:



2. Connect the Locator Pod as follows:

Clock	(Yellow)	to TP1
Ground	(Black)	to TP2
Start	(Green)	to TP3
Stop	(Red)	to TP3

USE STANDARD E-Z HOOKS ASSEMBLY ONLY

Connect the Logic Probe as follows:

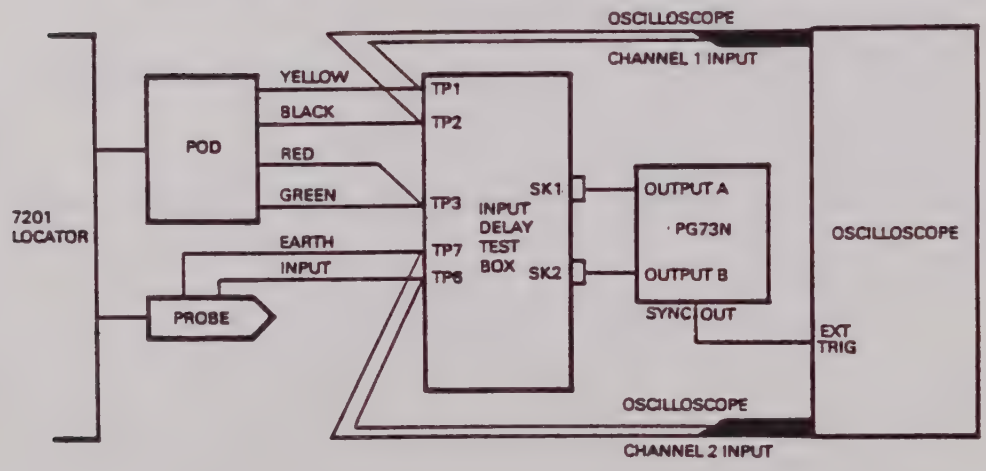
Use 6" earth leads plugged into side of probe body.

Input to TP6
Ground to TP7

Connect the oscilloscope as follows:

Channel 1 (CH1) to TP1
Earth to TP2

Channel 2 (CH1) to TP6
Earth to TP7



Select Oscilloscope Timebase to 0.05µs/cm
Set x 10 Horizontal MAG

Select Locator SIGNATURE

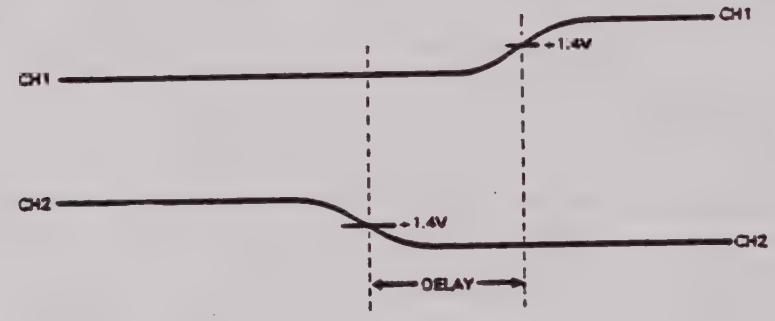
Set START TRIGGER POLARITY to positive
STOP TRIGGER POLARITY to positive
CLOCK POLARITY to positive

Set PG73N OUTPUT A to COMP
Check that switching OUTPUT B to COMP changes signature from 0000 to UP73.

3. Set OUTPUT B to NORM

Increase B DELAY from minimum until the signature changes from 0000 to UP 73.
Check that the delay from CH2 negative edge to CH1 positive edge is between 0 and 15ns.

The delay should be measured between the 1.4V crossing points of each waveform, as shown in the diagram below:



Decrease B BELAY until the signature changes back to 0000.
Check that the delay from CH2 negative edge to CH1 positive edge is between 0 and 15ns.

4. Set OUTPUT B to COMP.
Increase B DELAY from minimum until the signature changes from UP73 to 0000.
Check that the delay from CH2 positive edge to CH1 positive edge is between 0 and 15ns.

Decrease B DELAY until the signature changes from 0000 to UP73.
Check that the oscilloscope delay is between 0 and 15µs.

5. Set CLOCK POLARITY to negative
Set OUTPUT A to NORM
Set OUTPUT B to COMP

Increase B DELAY from minimum until the signature changes from UP73 to 0000.
Check that the delay from CH2 positive edge to CH1 positive edge is 0 to 15ns.

Reduce 'B' DELAY until the signature changes from 0000 to UP73.
Check that the oscilloscope delay is 0 to 15ns.

6. Set OUTPUT B to NORM

Increase B DELAY from minimum until the signature changes from 0000 to UP73.
Check that the delay from CH2 negative edge to CH1 negative edge is 0 to 15ns.

START-STOP SET-UP TIME (MODE 1)

1. Connect the Pod as follows:

Start	(Green)	to TP4
Stop	(Red)	to TP3
Clock	(Yellow)	to TP1
Ground	(Black)	to TP2

Connect the Logic Probe as follows:

Input to TP10
Ground to TP7

Connect the oscilloscope as follows:

CH1 to TP1
CH2 to TP4

Select Internal Trigger, CH2, positive slope.

Select SIGNATURE on Locator.

Set START TRIGGER POLARITY to positive
STOP TRIGGER POLARITY to negative
CLOCK POLARITY to positive

Set OUTPUTS A AND B to NORM

Increase B DELAY from minimum until the signature changes from 01UF to 00UP. There should be no backlash.
Check that the delay from CH2 +ve edge to CH1 +ve edge is 0 to 25ns.

2. Set OUTPUT A to COMP.

Select negative CLOCK POLARITY on Locator.

Increase B DELAY from minimum until the signature changes from 00UP to 007U.
Check that the delay from CH2 +ve edge to CH1 -ve edge is 0 to 25ns.

3. Select START TRIGGER POLARITY to negative
STOP TRIGGER POLARITY to positive
CLOCK POLARITY to negative

Select negative slope on the oscilloscope trigger.

Increase B DELAY from minimum until the signature changes from 00UP to 007U.
Check that the delay from CH2 -ve edge to CH1 -ve edge is 0 to 25ns.

4. Set OUTPUT A to NORM.

Select positive CLOCK POLARITY on Locator.
Increase B DELAY from minimum until the signature changes from 01UF to 00UP.
Check that the delay from CH2 -ve edge to CH1 +ve edge is 0 to 25ns.

5. Select MODE 2 on Locator.

Check that the following settings are made:

OUTPUT A	to	NORM
OUTPUT B	to	NORM
START TRIGGER POLARITY	to	negative
STOP TRIGGER POLARITY	to	positive
CLOCK POLARITY	to	positive

Change oscilloscope timebase to 0.1µs/cm, with x 10MAG.

Increase B DELAY from minimum until the signature changes from 01UF to 00UP.

Check that the delay from CH2 -ve edge to CH1 +ve edge is 0 to 80ns.

6. Select MODE 1 on Locator

Change the Pod connections as follows:

Green (Start) to TP3
Red (Stop) to TP4

Change oscilloscope timebase to 0.05µs/cm, with x 10MAG.

Increase B DELAY from minimum until the signature changes from 007U to 00UP.
Check that the delay from CH2 -ve edge to CH1 +ve edge is 0 to 25ns.

7. Select COUNT TRANS on Locator
START TRIGGER POLARITY to positive
STOP TRIGGER POLARITY to negative

Disconnect the Input Yellow Input Pod connection.

Connect the Pod as follows:

Green to TP3
Red to TP4

Connect the Probe as follows:

Input to TP1
Ground to TP7

Connect oscilloscope as follows:

CH1 to TP1
CH2 to TP4

Select Trigger slope to positive.

Set OUTPUT A To COMP
Set OUTPUT B To COMP

Increase B DELAY from minimum until the count changes from 15 to 16. Check that the delay from CH2 +ve edge to CH1 +ve edge is between +55ns and -25ns i.e. CH1 can occur 25ns before CH2. It may be necessary to change the oscilloscope timebase to make this measurement.

8. Set B DELAY to minimum.
Reduce A WIDTH (displayed as CH1 on oscilloscope) until the reading changes from 15.

Check that the CH1 pulse width is less than 45ns (+ve edge to -ve edge).

9. Set OUTPUT A to NORM
OUTPUT B to NORM

Set A WIDTH to 100ns between -ve and +ve edges, using the oscilloscope set on 0.1µs/cm x 10 range.

Reduce A WIDTH from about 100ns until reading changes from 16.

Check that the CH1 pulse width is less than 45ns (-ve edge to +ve edge).

10. Disconnect SK2 of the Delay Test Box.

Connect SK1 to the HP Pulse Generator, via 50Ω coax lead.
Monitor TP8 on the oscilloscope.

Set PERIOD to 1µs.

Select WIDTH RANGE to 0.015 to 0.04µs
WIDTH (VARIABLE) to maximum
TRANSITION TIME to minimum
OFFSET to OFF
AMPLITUDE to +3V

Connect the Probe as follows:

Input to TP8
Ground to TP7

Select FREQUENCY on Locator.
Check that the reading is approximately 1MHz.
Reduce the pulse width until reading begins to drop.
Check that the pulse width from +ve edge to -ve edge at the +2.4V crossing point is less than 15ns.

11. Connect the Logic Probe input to TP1
Connect the Oscilloscope input to TP1
Increase the pulse width and then reduce it until the reading falls from 1MHz.

Check the pulse width from -ve to +ve edge at the +0.4V crossing point is less than 15ns.

Increase the pulse width to 20ns at the 0.4V crossing point.
Select 10-50 MHz range on Pulse Generator RATE.

Increase frequency from 10MHz.
Check that at least 20MHz can be displayed.

If possible, check the frequency with another frequency counter.
Both instruments should read within ± 10kHz at 20MHz.

12. Connect the Logic Probe and Oscilloscope to TP8.
Set 1µs ± 0.3µs pulse rate by monitoring on the oscilloscope.

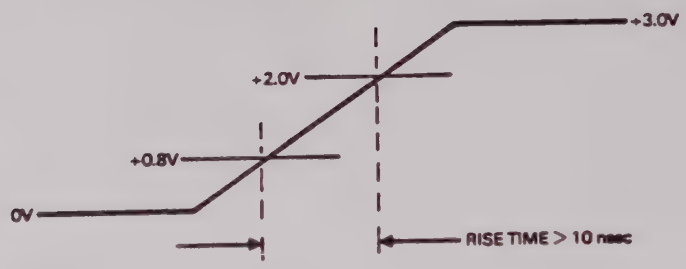
Use Pulse Generator internal trigger. Do not set to exactly 1µS or phase locking may occur.

Set width to 300ns ± 100ns (+ve to -ve)

Set LOGIC LEVEL on locator.

Display should show 100.0% or 99.9%.
Increase the Leading Edge Transition Time on the Pulse Generator until the reading falls by 0.1%.

Check that the signal rise time is more than 10ns as defined in the diagram below:



13. Set Transition Times to minimum.

Connect the Pod as follows:

Yellow	to TP1
Black	to TP2
Green	to TP5
Red	to TP5

Connect the probe as follows:

Input to TP3
Ground to TP7

Connect the oscilloscope as follows:

CH2 to TP1

Select Trigger slope to negative.

Set the Pulse Generator width to 25ns from +ve to -ve edge, at the 1.4 crossing point of CH2.

Select SIGNATURE on Locator.

Set START TRIGGER POLARITY to positive
STOP TRIGGER POLARITY to positive
CLOCK POLARITY to positive

Check that the Signature is C133.

14. If there is no GATE lamp flashing, ensure that the DISABLE switch on the INPUT DELAY TEST BOX is ON.

Increase the frequency on the Pulse Generator until the signature goes unstable. Reduce frequency until the signature is just stable on C133.

Select FREQUENCY on Locator.
Check that the reading is greater than 1.25MHz, which is input clock rate of 20MHz.

Reduce frequency of pulse generator to 10MHz, or less.
Select LINE SIGNATURE on Locator.

Check that the reading is OFF C133.

15. Increase the input frequency until the UNSTABLE lamp turns on. Decrease the input frequency until the UNSTABLE lamp just turns off. (NOTE that the displayed reading may remain stable when the UNSTABLE lamp first comes on. This indicates instability in the intermediate signatures stored in memory.)

Select FREQUENCY on Locator.
Check that the reading is greater than 0.9375Hz, implying a clock rate of 15MHz.

DAUGHTER BOARD

1. Set the pulse generator rate to 1µs ± 0.3.

Set the pule generator width to 300µs ± 100 from +ve edge to -ve edge.
Connect the Datapod as follows:

Clock (Yellow) to TP1
Black (Ground) to TP2
Start (Green) to TP3
Stop (Red) to TP5

Connect the Logic Probe as follows:

Input to TP3
Ground to TP7

Select LINE SIGNATURE on Locator

With the START TRIGGER, STOP TRIGGER and CLOCK POLARITY settings as shown below, check that their respective MODE 1 and MODE 2 readings are correct.

START TRIGGER POLARITY	STOP TRIGGER POLARITY	CLOCK POLARITY	DISPLAYED DATA MODE 1	MODE 2
⌐	Either	⌐	OFF7 C133	OFF7 C133
⌐	Either	⌙	OFF7 C133	OFF8 6266
⌙	Either	⌐	OFEF H6AH	OFEF H6AH

2 With the START TRIGGER and STOP TRIGGER settings as shown below, check that their respective COUNT EVENTS AND COUNT TRANS readings are correct.

START TRIGGER POLARITY	STOP TRIGGER POLARITY	COUNT EVENTS	COUNT TRANS
⌐	⌐	254 or 255	509, 510 or 511
⌐	⌙	254 or 255	509, 510 or 511
⌙	⌐	255	508, 509 or 510
⌙	⌙	255	508, 509 or 510

LOGIC PROBE AND DATA POD

1. Preliminaries

1.1 Connect the Logic Probe to the HP Pulse Generator via a BNC-BNC lead, with a 50Ω terminator at the Logic Probe end.

1.2 The 7201 Input Delay Test Box may be used as terminator. Power to the Test Box is not required. Connect the BNC lead to SK1 of the Delay Test Box, the Probe input to TP8, and the Probe ground to TP7.

1.3 Connect oscilloscope CH1 to the same point as the Logic Probe, using a 4¾" earth clip.

1.4 Connect the Logic Probe ribbon cable to SK5 of 7201 PCB 1.

1.5 Place the DIP CLIP on IC63.
Connect the oscilloscope CH2 earth clip to the ground test point on 7201 PCB 1, near the central mounting pillar.

2. Set the HP Pulse Generator controls as follows, using the oscilloscope CH1 to monitor the signal.

RATE	1MHz
WIDTH	0.015 to 0.04µs range
WIDTH VARY	MAXIMUM (about 0.2µs)
TRANSITION TIME	0.007 to 0.2µs range
VARY	MINIMUM
OFFSET	OFF
AMPLITUDE	+2.8V

3. Measure the signal delay from the Logic Probe input to IC63. Use CH2 of the oscilloscope to monitor the signal on IC63. IC63 Logic Levels are ECL, i.e.

Logic 1 is - 0.8V
Logic 0 is - 1.8V
Threshold is - 1.3V

4. Measure the delay from the positive edge of CH1 at the +2.0V crossing point to IC63, pin 1, positive edge, at the -1.3V crossing point.
Check that the delay is between 20 and 25ns.

5. Measure the delay from the positive edge of CH1 at the +2.0V crossing point to IC63, pin 9, negative edge, at the -1.3V crossing point.
Check that the delay is between 20 and 25ns.

6. Measure the delay from the negative edge of CH1 at the +0.8V crossing point to IC63, pin 3, positive edge, at the -1.3V crossing point.
Check that the delay is between 20 and 25ns.

7. Measure the delay from the negative edge of CH1 at the +0.8V crossing point to IC63, pin 7, negative edge, at the -1.3V crossing point.
Check that the delay is between 20 and 25ns.

8. Connect CH2 to IC63, pin 1. Reduce the pulse amplitude on the pulse generator, until the pulse on CH2 just disappears.

Check that the high level of the pulse on CH1 is 2.0V ± 0.2V.

9. Set the pulse height to +2.8V. Connect CH2 to IC63 pin 3. Select POS OFFSET on the pulse generator and increase it until the pulse on CH2 just disappears.
Check that the low level of the pulse on CH1 is 0.8V ± 0.2V.

10. Press the hold switch on the Probe body, and check that the LED on the Probe body turns on. (This test only applies on a partially assembled PCB 1, where the hold switch input on pin 10 of SK5 is connected to pin 1 of SK5 via a 270Ω resistor.)

To perform this test on a fully working unit, select FREQUENCY on Locator panel. Press the hold switch and check that the GATE lamp turns off and stays off, until the hold switch is released.

Check the lamp by connecting a pulse to the probe input as in Section 3. The lamp should be flashing.

11. Disconnect the logic probe.
Connect a multimeter across the probe input (input and ground).
Check that the voltage is 1.4V ± 10%.
Check that the current is 30µA ± 20%.

12. Connect the Pod to SK4 of 7201 PCB 1 and measure the delay from the Pod inputs to IC63. Use the standard E-Z Hooks assembly to 16-way ribbon cable plug to take measurements. Connect the Black input to the Input Delay Test Box TP7 (or ground of BNC socket). Connect one other input at a time to TP8 (or signal of BNC socket).

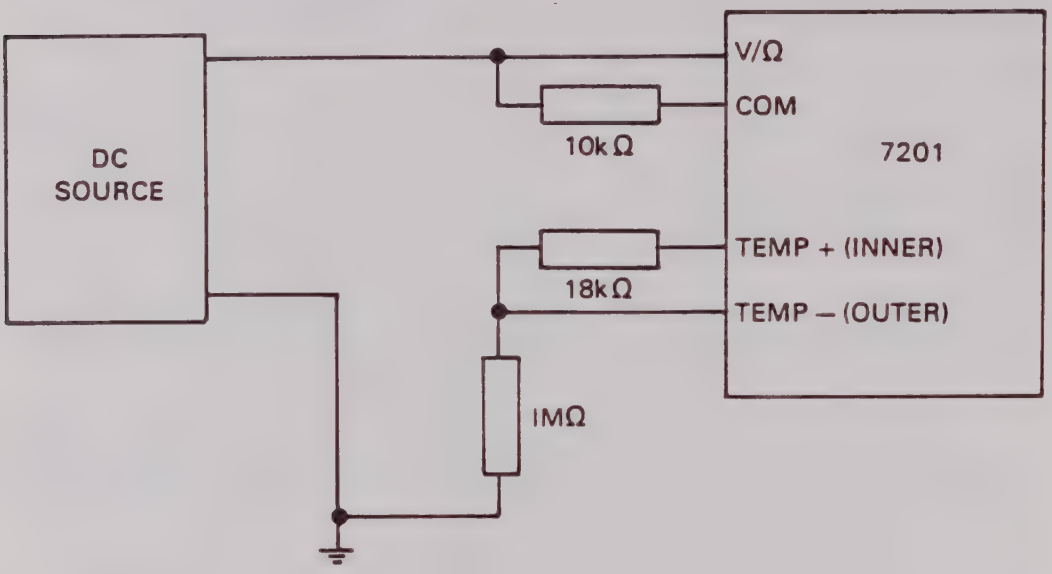
The delay is measured from the ±1.4V crossing of the input pulse which should be set up as in Section 3 above, to the -1.3V crossing point of the signal on IC63. The delay is measured from both positive and negative edges of the input. The delay for all inputs should be between 10 and 15ns.

Check Green input to IC63 pins 5,6
Red input to IC63 pins 4,2
Yellow input to IC63 pins 14,15

COMMON MODE TESTS

1. Connect the instrument as shown in the diagram below. Select V ⎓ and note the reading with the common mode voltage at zero. Raise the common mode voltage to 500V and check that the reading changes by not more than 0.01Vdc.

2. Reduce the common mode voltage to zero, and select TEMP. Note the reading, which should be approximately 80°C. Raise the common mode voltage to 500V and check that the reading changes by not more than 1.0°C.



Ω OVERLOAD CHECK

1. Select Ω and connect +350V between V/Ω and COM (black) for 5 seconds, and check that the display reads 20160000r and flashes. Remove the 350V input and short circuit the input leads. Check that the display reads <2r.

2. Repeat para 1 for -350V instead of +350V.

CALIBRATION CHECKS

TEST EQUIPMENT

The test equipment listed below should be available to carry out calibration tests and must have an accuracy/uncertainty equal to or better than that shown in the calibration tables.

a) Rotek AC/DC wide-band precision calibrator model 610.

b) Multimeter, e.g. Locator or 7045, which must be able to measure up to 2V ± 10mV and 30µA ± 1µA.

DMM FUNCTION

These procedures are for checking and calibrating the DMM pcb of 7201 following component replacement. The DMM pcb is fitted in its usual position within the instrument, with the top of the instrument removed to one side. The ambient temperature is to be 25°C ± 5°C.

To verify if calibration is required, use the Overall Calibration Check Table on page 3.20.

1. Preliminaries

1.1 Secure the pcb to the instrument with the lower screen in place, and use the special centre screw to ensure that the electrical connection is made with the screen.

1.2 Connect the pcb to the main board using the 16-way plug to SK201.

1.3 Switch on the instrument and check that the floating power supplies are as follows, taking the negative end of C218 as the 0V reference:

C218, +ve end	+12.0V ± 0.6V
C220, -ve end	-12.0V ± 0.6V
C222, -ve end	-5.0V ± 0.3V

1.4 Select V $\overline{---}$ and apply +1.000V to the high input (red) with respect to the lower input (black). Check that the instrument reads 1.000Vdc. (±0.0300).

Continue the Calibration checks by following tables 2, 3 and 4.

2. V/Ω Calibration

Test	Function	Input	Action	Display	Remarks
2.1	V⎓	s/c	Adjust RV201	±0.000dc	I/P Amplifier zero
2.2	Ω	"	Check	Or (+1-0)	Ω Zero check
2.3	"	10.000kΩ	Adjust RV202	10000r(±10)	Ω Cal. (last digit fixed at 0)
2.4	"	o/c	Check	20160000r	Flashing overload
2.5	V⎓	+18.000V	Adjust RV203	18.00dc(±1)	Volts calibration
2.6	"	-18.0000V	Check	-18.00dc(±2)	V-f linearity check
2.7	"	+1.80000V	"	1.800dc(±3)	
2.8	"	+180.00V	"	180.0dc(±3)	
2.9	"	+1000.0V	"	1000.dc(±2)	
2.10	"	+1000Ω	"	1000r(±2)	
2.11	"	100KΩ	"	100000r(±200)	last 2 digits fixed at 0).
2.12	"	1MΩ	"	1000000r(±2000)	last 3 digits fixed at 0).
2.13	"	10MΩ	"	10000000r (±20000)	last 4 digits fixed at 0).
2.14	V⎓	s/c	Check frequency on TP5	26kHz(± 5kHz)	V-f offset check

3. V ~ Ranging and Frequency Response Check

Test	Function	Input	Frequency/Display		Remarks
3.1	V~	1.800V	400Hz	1.800ac (± 7)	rms converter cal check
3.2	"	.180V	"	0.180ac (± 2)	rms converter linearity check
3.3	"	1.800V	40Hz	1.800ac (± 7)	
3.4	"	18.00V	"	18.00ac (± 7)	
3.5	"	180.0V	"	180.0ac (± 7)	
3.6	"	500V	"	500ac (± 3)	
3.7	"	"	1kHz	500ac (± 3)	
3.8	"	180.0V	"	180.0ac (± 7)	
3.9	"	18.00V	"	18.00ac (± 7)	
3.10	"	1.800V	"	1.800ac (± 7)	

4. Current (I) Ranging Checks

Input applied between blue (high) and black (low) sockets

Test	Function	Input	Frequency	Action	Reading	Remarks
4.1	$\overline{\text{I}}$---	o/c	dc	Check	0.000000dcI (± 2)	Zero check
4.2	"	1.000mA	"		0.001000dcI (± 4)	
4.3	"	10.00mA	"		0.01000dcI (± 4)	
4.4	"	100.0mA	"		0.1000dcI (± 4)	
4.5	"	1.000mA	"	"	1.000dcI (± 4)	
4.6	"		"	Check terminal voltage	<0.3V	Burden check
4.7	I~	o/c		Check	0.000000acI (± 3)	
4.8	"	1mA	40Hz	"	0.001000acI (± 6)	
4.9	"	"	1kHz	"	0.001000acI (± 6)	

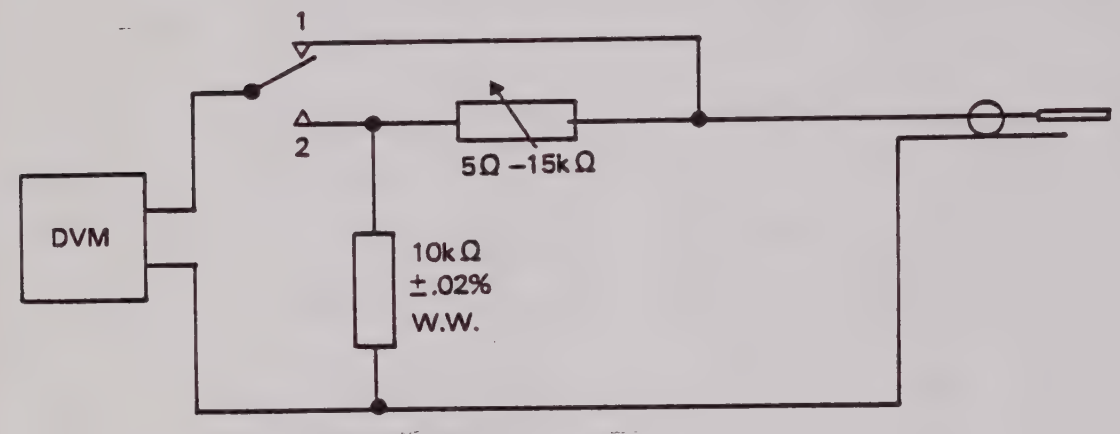
TEMPERATURE FUNCTION CALIBRATION

1. Connect the 2.5mm jack plug of the test circuit shown in the diagram below to the appropriate socket of Locator and select TEMP.

2. With the DVM in switch position 1, check that its reading is 6.4V ± 0.4V.

3. Change to DVM position 2, and adjust the variable resistor to obtain a reading of 3.000V. Adjust RV204 to give a reading on the 7201 of 17.8°C ± 1 digit.

4. Adjust the variable resistor again to give a reading of 4.000V on the DVM. Check that the 7201 now reads 117.8°C ± 4 digits.



TEMPERATURE PROBE CALIBRATION

1. **Test Equipment**

A metal block equipped with a thermometer accurate to 0.2°C is required. The arrangement should include a cover to exclude draughts with a hole giving probe access to the middle of the metal surface.

The probe is to be tested using a 7201 calibrated as described in the sub-section above.

2. **Procedure**

2.1 Place the thermometer block on the bench away from any sources of heat and allow time to achieve steady ambient temperature.

2.2 Place the tip of the temperature Probe in firm contact with the metal block and allow 20-30 seconds for the reading to settle. Adjust the probe preset potentiometer to obtain a reading equal to that of the thermometer.

OVERALL CALIBRATION CHECK

Test	Function	Input	Frequency	Reading	Tolerance
1.	V⎓	s/c	-	0.000dc	± 4 digits
2.	"	+1.800V	-	1.800dc	± 9 "
3.	"	-1.800V	-	-1.800dc	± 9 "
4.	"	+18.00V	-	18.00dc	± 6 "
5.	"	-18.00V	-	-18.00dc	± 6 "
6.	"	+180.0V	-	180.0dc	± 6 "
7.	"	+1000V	-	1000dc	± 6 "
8.	Ω	s/c	-	0r	±1 digit
9.	"	1KΩ	-	1000r	±4 digits
10.	"	10KΩ	-	10000r	±40 "
11.	"	100KΩ	-	100000r	±400 "
12.	"	1MΩ	-	1000000r	±4000 "
13.	"	10MΩ	-	10000000r	±40000 "
14.	V~	100mV	1kHz	0.100ac	±1 digit
15.	"	1000mV	"	1.000ac	±7 digits
16.	"	10.00mV	"	10.00ac	±7 "
17.	"	100.0mV	"	100.0ac	±7 "
18.	"	500V	"	500ac	±4 "
19.	"	"	40Hz	500ac	±4 "
20.	"	100.0V	"	100.0ac	±7 "

Test	Function	Input	Frequency	Reading	Tolerance
21.	V~	10.00V	40Hz	10.00ac	± 7 digits
22.	"	1.000V	"	1.000ac	± 7 "
23.	"	100mV	"	0.100ac	± 1 digit
24.	I⎓	o/c	"	.000000dcI	± 4 digits
25.	"	1.000mA	dc	.001000dcI	± 8 "
26.	"	10.00mA	"	.01000dcI	± 5 "
27.	"	100.0mA	"	.1000dcI	± 5 "
28.	"	1.000mA	"	1.000dcI	± 5 "
29.	I~	1.000mA	40Hz	.001000acI	± 10 "
30.	"	1.000mA	1kHz	.001000acI	± 10 "
31.	"	.100mA	1kHz	.000100acI	± 2 "
32.	Ω	s/c	-	0r	± 2 "

CHAPTER 4
Technical Specification

Logic Test Functions

SIGNATURE ANALYSIS FUNCTIONS

Signature

Maximum Clock frequency:	20MHz
Data Set up time*:	15ns
Data Hold time*:	0ns
Start/Stop:	
Mode 1 Hold time:	0ns
Mode 1 Setup time:	25ns
Mode 2 Hold time:	0ns
Mode 2 Setup time:	80ns
Minimum time between Start and Stop:	2 Clock-pulses
Minimum time between Stop and Start:	1 Clock-pulse

Display Data

Signature: 4 hexadecimal characters updated after Stop signal

Characters: 0123456789APCdEF
or 0123456789ACFHPU

Line Signature

Maximum clock frequency:	15MHz
Maximum stored signatures:	128

Data Set up time:
Data Hold time:as for signature (above)
Start/Stop times:
Stop: On Stop signal or after 128 lines, whichever is the shorter

Line Data

Maximum clock frequency:	15MHz
Maximum states stored:	2048

Data/Start/Stop times:
Stop: On Stop signal or after 8 lines, whichever is the shorter

*Setup time is the minimum time that Data must remain stable before the Clock occurs. Hold time is the time the Data must remain stable after clock edge.

LOGIC LEVEL

Thresholds:	≥2V (±0.2V)=High
	≤0.8 (±0.2V)=Low
Sensitivity:	0.1%
Limit of Error (for transition time Hi/Lo<10ns, and frequency<1MHz):	0.1%
Detectable bad pulse:	
minimum width:	25ns
guaranteed minimum:	110ns
Sample rate:	10MHz

COUNTER/TIMER FUNCTIONS

Frequency

Range of Measurement:	1Hz to 20MHz
Sensitivity:	1Hz
Limits of Error:	±[0.003% reading + 1 digit]
Reading time:	1.1s
Gate time:	1s
Minimum detectable pulse:	25ns

Period/Pulse-width/Delay

Range of measurement:	100ns to 10ns
Sensitivity	100ns
Limits of Error:	±[0.003% reading + 1 digit]

Count Events/Transitions

Range of Measurement:	to 10^8 -1
Count rate maxima:	
Events:	20 x 10^6/s
Transitions:	20 x 10^6/s
Minimum edge separation:	45ns
Start/Stop set-up time*:	55ns
Start/Stop hold time*:	20ns

*Set-up time is the minimum time that Start/Stop must remain stable before Data occurs. Hold time is the time the Start/Stop must remain stable after Data.

DMM FUNCTIONS

DC VOLTAGE (V⎓) Autoranging

Range (Full Scale)	Sensitivity	Limit of Error ±[%reading + digits]	
2.015V	1mV	0.3	4
20.15V	10mV	0.3	1
201.5V	100mV	0.3	1
1000V	0.5V	0.3	1

Max input voltage: 1.2kV
Temperature coefficient: † ±0.01%rdg/°C
Zero offset: ±0.2mV/°C
Input resistance: 10MΩ
Reading rate: 2 per second

AC VOLTAGE, RMS (V~) Autoranging

Range (Full Scale)	Sensitivity	Limit of Error 40Hz to 1kHz ±[%reading + digits]	
2.015V	1mV	0.6	1
20.15V	10mV	0.6	1
201.5V	100mV	0.6	1
500V	0.5V	0.6	1

* Limit of Error applies above 100mV
Max. input voltage: 500V ac rms
400V dc
Temperature coefficient: † ±0.02%rdg/°C
Input Resistance: 10MΩ
Reading rate: 2 per second
Max Crest factor: 4:1

DIRECT CURRENT (|⎓) Autoranging

Range (Full Scale)	Sensitivity	Limit of Error ±[%reading + digits]	
2.015mA	1µA	0.5	4
20.15mA	10µA	0.5	1
201.5mA	100µA	0.5	1
2.015A	1mA	0.5	1

Overload protection: 2 Amp fuse
Temperature coefficient: ±0.02%rdg/°C
Burden (maxima):
1µA to 0.2A 0.3V
0.2A to 2A 0.6V
Reading rate: 2 per second

ALTERNATING CURRENT, RMS (|~) Autoranging

Range (Full Scale)	Sensitivity	Limit of Error* ±[%reading + digits]	
2.015mA	1µA	0.9	2
20.15mA	10µA	0.9	1
201.5mA	100µA	0.9	1
2.015A	1mA	0.9	1

*Limit of Error applies above 100µA
Overload protection: 2 Amp fuse
Temp. coeffiecient: ±0/03% rdg°/C
Burden (maxima):
1µA to 0.2A 0.3V
0.2A to 2A 0.6V
Reading rate: 2 per second
Max crest factor: 4:1

RESISTANCE (Ω) Autoranging

Range (Full Scale)	Sensitivity	Limit of Error ±[%reading + digits]	
2.015kΩ	1Ω	0.3	1
20.150kΩ	10Ω	0.3	1
201.500kΩ	100Ω	0.3	1
2.015000MΩ	1kΩ	0.3	1
20.150000MΩ	10kΩ	0.5	1

Overload protection: 250V dc or RM
Open Circuit input: 12V (100nA max)
Max. input power: 2mW (2V at 1mA)
Temperature coefficient:† ±0.01%rdg/1°C
Reading rate: 2 per second

TEMPERATURE

Range of measurements(sensor):-10°C to 150°C
Limits of Error:
at 25°C: ±1°C
over full range: ±3°C
Display: user selectable, °C or °F

† T.C. applies outside the range +20°C to +30°C

PROBES & PODS

Logic probe
Input impedance: 47kΩ//13pF
Open circuit input voltage: 1.4V
Logic thresholds: ≥2V(±0.2V)=High
≤0.8V(±0.2V)=Low
Overdrive for specified speed:High>2.4V
Low<0.4V
Overload protection: 150V~continuous
240V~for 1 minute

Indicator Lamp
unlit = logic 0
brightly lit = logic 1
dull = floating input
flashing = active input
active state:
minimum pulse width to activate
flashing: 10ns
flash "ON" duration: 50ms

Datapod
Start/Stop/Clock inputs
Input impedance: 47kΩ//13pF
Open circuit input voltage: 5.0V
Threshold: 1.4V ±0.4V
Overload protection: ±30V

Clock qualifier inputs (3 active High. 3 active low):
Input impedance: 10kΩ//13pF
Open circuit voltage:
Active High: +5.0V
Active Low: -1.4V
Input current at +2V
(Active low only): <1mA

Max. applied voltage swing: +7.0V to -0.5V
Threshold: 1.4V ±0.4V

Current Probe
See separate specification.

GENERAL SPECIFICATIONS

Environmental
Operating temperature range: 0°C to + 40°C
Storage temperature range: -40°C to + 70°C
Percentage relative humidity: 70% at + 40°C

General environmental specification to REMC/20/FR
Category III (U.K. Defence Standard)

Safety
This instrument conforms to IEC 348

Power requirements
Mains (Line):90 to 130/190 to 260~,50/400Hz
20V to 30V dc
Consumption 65VA

Dimensions
Depth: 425mm (16.75ins)
Width: 314mm (12.375ins)
Height: 97.5mm (3.84ins)

Weight: 7kg (15lb)

CHAPTER 5

PCB NOTATION DIAGRAMS & PARTS LISTS

This chapter contains the pcb notation diagrams and parts lists for models of Locator which have been modified to Mod. Strike Al state.

This chapter contains detailed Parts Lists for each of the printed circuit boards fitted in the instrument. When ordering spare parts, it is essential to quote the instrument serial nuimber, located on the rear panel, as well as the full description shown in the appropriate parts list.

COMPONENT PARTS LISTS ABBREVIATIONS

CIRCUIT REFERENCE

C	Capacitor (µF)	R	Resistor (Ω)
D	Diode	RL	Relay
FS	Fuse RV	RNL	Non Linear Resistor (Ω)
IC	Integrated Circuits	RV	Variable Resistor (Ω)
L	Inductor	S	Switch
LP	Lamp (including Neon)	SK	Socket
LK	Link T	T	Transformer
MSS	Mains Selector Switch	TP	Terminal Post (or Test Point)
PL	Plug	TR	Transistor
		C	Crystal

COMPONENT PARTS LIST ABBREVIATIONS

Fixed Resistors

Carbon Composition	CACP
Carbon Film	CAFM
Cracked Carbon	CKCA
Metal Film	MEFM
Metal Glaze	MEGL
Metal Oxide	MEOX
Power Wirewound	POWW
Precision Wirewound	PRWW
Temperature Sensitive	TEMP
Thick Film	TKFM
Thin Film	TNFM
Voltage Sensitive	VOLT

Variable Resistors

Carbon Front Panel Multiturn	CAFM
Carbon Front Panel Single Turn	CAFS
Carbon Preset Multiturn	CAPM
Carbon Preset single Turn	CAPS
Cermet Front Panel Multiturn	CMFM
Cermet Front Panel Single Turn	CMFS
Cermet Preset Multiturn	CMPM
Cermet Preset Single Turn	CMPS
Wirewound Front Panel Multiturn	WWFM
Wirewound Front Panel Single Turn	WWFS
Wirewound Preset Multiturn	WWPM
Wirewound Preset Single Turn	WWPS

Capacitors

Air	AIR
Aluminium Electrolytic	ALME
Aluminium Solid	ALMS
Polyarbonate	CARB
Ceramic	CERM
Polyester Foil	ESTF
Polyester Metallised	ESTM
Glass	GLAS
Mica	MICA
Metallised Lacquer	MLAC
Paper foil	PAPF
Paper Metallised	PAPM
PTFE	PTFE
Polypropylene Film	PLYN
Polystryene	STYR
Tantalum Dry	TAND
Tantalum Foil	TANF
Tantalum Wet	TANW

PCB 1

Cct Ref	General Description				Solartron Part No.
R1 to R6	CACP	3.3k	1/4W	10%	172033300
R7	CACP	6.8k	1/4W	10%	172036800
R10	CACP	180k	1/4W	10%	172051800
R11	CACP	18k	1/4W	10%	172041800
R12	CACP	18k	1/4W	10%	172041800
R101	MEFM	33k	1/8W	0.5%	192743301
R102	MEFM	100k	1/8W	0.5%	192751001
R103	CACP	270	1/4W	10%	172022700
R104	CACP	2.2k	1/4W	10%	172032200
R105	CACP	1k	1/4W	10%	172031000
R106	CACP	1k	1/4W	10%	172031000
R107 to R114	CACP	120	1/4W	10%	172021200
R115 to R117	CACP	3.3k	1/4W	10%	172033300
R118	CACP	1k	1/4W	10%	172031000
R119	CACP	1k	1/4W	10%	172031000
R120	CACP	82	1/4W	10%	172018200
R121	CACP	390	1/4W	10%	172023900
R122	CACP	82	1/4W	10%	172018200
R123	CACP	390	1/4W	10%	172023900
R124	CACP	1k	1/4W	10%	172031000
R125	CACP	1k	1/4W	10%	172031000
C1	TAND	4.7	10V	±10%	265364700
C2	TAND	4.7	10V	±10%	265364700
C3 to C12	CERM	47n	12V	+50% -25%	241744700
C13	TAND	4.7	10V	±10%	265364700
C101	TAND	4.7	10V	10%	265364700
C102	TAND	4.7	10V	10%	2653664700
C103 to C120	CERM	47n	12V	+50% -25%	241744700
C126	CERM	68p	500V	20%	241316800
C127	CERM	22n	25V	+50% -20%	241842200

PCB 1

Cct Ref	General Description	Solartron Part No.
TR101	2N2369	300552390
IC1	74LS390	510004410
IC2	74S86	510003360
IC3	74S175	510003460
IC4	74LS174	510002970
IC5	74LS96	510004710
IC6	RAM 68A10	510002760
IC7	74LS390	510004410
IC8	74LS74	510002600
IC9	74S00	510003270
IC10	74S151	510004720
IC11	74LS04	510002690
IC12	74LS196	510004710
IC13	74LS157	510002240
IC14	74LS00	510002000
IC15	74LS08	510002910
IC16	74LS174	510002970
IC17	74196	510001210
IC18	74LS244	510004500
IC19	RAM 68A10	510002760
IC20	74LS163AN	510004170
IC21	74125N	510001490
IC22	74LS14	510003120
IC23	74LS00	510002000
IC24	74S74	510002020
IC25	74LS08	510002910
IC26	74LS244	510004500
IC27	74LS163AN	510004170
IC28	74S02	510003280
IC29	74S00	510003270
IC30	74LS02	510002230
IC31	74S153	510003430
IC32	74LS138	510003530
IC33	74LS163AN	510004170
IC34	74LS10	510002870
IC35	74S151	510004720
IC36	74S74	510002020
IC37	74LS04	510002690
IC38	74LS51	510003520
IC39	74LS163AN	510004170
IC40	74LS245	510004560

Cct Ref	General Description	Solartron Part No.
IC41	74LS151	510002720
IC42	74S112	510003370
IC43	74LS10	510002870
IC44	74LS08	510002910
IC45	74S74	510002020
IC46	74LS163AN	510004170
IC47	74LS245	510004560
IC48	74LS151	510002720
IC49	74S112	510003370
IC50	7412	510002090
IC51	74LS96	510004710
IC52	74LS32	510003140
IC53	74LS244	510004500
IC54	74S04	510004500
IC55	74LS74	510002600
IC56	74LS123	510002950
IC57	MC10125P	510004750
IC58	74LS244	510004500
IC59	74LS169AN	510004170
IC60	74LS244	510004500
IC61	MC10125P	510004750
IC62	Resistor Network 220/330 2%	160400600
IC63	Resistor Network 220/330 2%	160400600
IC64	MC10135P	510004950
IC65	74LS163AN	510004170
IC66	MC10124P	510004740
IC67 to IC69	MC1014P	510004760
IC70	Resistor 15k 1/8W ±2% Network	160400568
IC73	2532	510004530
IC74	2532	510004530
IC75	MC6802P	510004510
IC76	74LS245	510004560
IC77	74LS244	510004500
IC78	2114-3	510004460

Cct Ref	General Description	Solartron Part No.
IC79	74LS244	510004500
IC80	74LS244	510004500
IC81	2114-3	510004460
IC82	74LS244	510004500
IC83	74LS244	510004500
IC84 to IC86	74LS273	510004380
IC87 to IC89	74LS175	510003170
IC90	74LS03	510004140
IC91	74LS74	510002600
IC92	Resistor Network 6.8k 1/8W ±2%	160400569
IC93	74LS123	510002950
IC94	74S04	510002660
IC95	74LS138	510003530
IC96	74LS138	510003530
IC97	74LS20	510002700
IC98 to IC100	74LS74	510002600
IC101	74LS32	510003140
IC102	74LS139	510002960
IC103	74LS138	510003530
IC104	74LS04	510002690
IC105	74LS10	510002870
D101	SD3	300522160
X1	XTAL QC1310T	300810320
SW1	DIL Switch 4-way	375000550
SW1	DIL Switch 6-way	375000570
SW3	DIL Switch 4p 2W	375000610
SK1	DIL Socket 16-pin	300584900
SK2	Socket 3446-2302	352310070
SK3	Socket 3428-2302	352320020
SK4	Socket 3428-2302	352320020

PCB 1

Cct Ref	General Description	Solartron Part No.
SK3	Socket 3446-2302	352310070
SK6	34-way header	352334030
SK7 to SK9	DIL Socket 16-pin	300584900
SK10	DIL Socket 40-pin	300584970
SK11 to SK14	DIL Socket 24-pin	300584910
TP1	Disconnect pins	355900550
TP3 to TP6	Disconnect pins	355900550
TP101 to TP104	Disconnect pins	355900550
LKA	Disconnect pins	355900550

PCB 2

Cct Ref	General Description				Solartron Part No.
R201	CACP	1k	1/4W	10%	172031000
R202	MEFM	1M	1/4W	25%	160400572
R203	Resistor Network				160400602
R204	MEFM	1.1k	1/8W	0.05%	160400575
R205	CACP	10	1/4W	10%	172011000
R206	MEFM	100k	1/8W	0.1%	192951004
R207	Resistor Network				160400602
R208	PRWW	0.1		0.25%	160300428
R210	MEOX	470	1/2W	5%	193524700
R211	POWW	7.5k	12W	5%	174337500
R212	POWW	15k	6W	5%	173741500
R213	CACP	10k	1/4W	10%	172041000
R214	CACP	1k	1/4W	10%	172031000
R220	MEFM	15k	1/8W	0.5%	192741502
R221	MEFM	24k	1/8W	0.5%	192742402
R222	MEFM	100k	1/4W	0.5%	192851000

Cct Ref	General Description				Solartron Part No.
R223	CACP	15k	1/4W	10%	172041500
R224	MEFM	15k	1/8W	0.5%	192741504
R225	CACP	10k	1/4W	10%	172041000
R226	CACP	10k	1/4W	10%	172041000
R227	CACP	470	1/4W	10%	172024700
R228	MEFM	10k	1/8W	0.1%	192941004
R229	MEFM	6.8k	1/8W	0.5%	192736804
R230	MEFM	470k	1/8W	0.5%	192754702
R231	MEFM	3.4k	1/8W	0.5%	192733401
R232	MEFM	10k	1/8W	0.1%	192941004
R233	Resistor Network	8 x 68k		2%	160400571
R234	CACP	3.3k	1/4W	10%	172033300
R235	Resistor Network	8 x 680		2%	160400570
R236	CACP	1k	1/4W	10%	172031000
R238	MEFM	100k	1/8W	0.125%	192751002
R239	MEFM	100	1/8W	.5%	192721002
R240	CACP	470	1/4W	10%	172024700
R241	CACP	1.5k	1/4W	10%	172031500
R242	CACP	82	1/2W	10%	172318200
R245	CACP	5.6K	1/4W	10%	172035600
R246 to R248	CACP	2.2	1/2W	10%	172302200
R249	CACP	220	1/4W	10%	172022200
R250	MEFM	24k	1/8W	0.5%	192742404
R251	CACP	1M	1/2W	10%	172361000
RV201	CMPM	100	1/2W	10%	130951000
RV202	CMPM	5	1/2W	10%	130935000
RV203	CMPM	5	1/2W	10%	130935000
RV204	CMPM	200	1/2W	10%	130922000
C201	ESTM	22n	400V	±10%	226042200
C206	ESTM	2.2	63V	±20%	225262200
C207	CERM	47n	30V	±50%	241944700
C209	TAND	2.2	20V	20%	265862200
C210	CERM	47n	30V	+50% -25%	241944700
C211	MICA	680P	350V	5%	250326800
C212	MICA	820P	350V	5%	250328200
C213	CERM	47n	30V	+50%	241944700

Cct Ref	General Description				Solartron Part No.
C214	CERM	3.3n	500V	25%	241333300
C215	ESTM	22n	100V	10%	225442200
C216	TAND	100	10V	20%	265481000
C217 to C220	TAND	47	20V	20%	265874700
C221	TAND	100	10V	20%	265481000
C222	TAND	100	10V	20%	265481000
TR201	MPSA13				300554560
TR202	BC107				300553320
TR203	BC107				300553320
TR204	BFX34				300554540
IC201	AD542KH				510090780
IC202	AD536AKH				510090770
IC203	LM13AH				510090900
IC204	MC1458G				510090400
IC206	ULN2003AN				510004980
IC207	74LS145N				510004990
IC208	74LS00N				510002000
IC209	74LS02N				510002230
IC210	74LS86N				510002880
IC211	DG508				510090790
IC212	6N136				300540150
IC213	ILQ74				300540250
IC214	ILQ74				300540250
D201	IN4007				300524990
D202	IN4007				300524990
D203	SD3				300522160
D204	SD3				300522160
D205	Zener 6.8V				300522540
D208	SD3				300522160
D209	SD3				300522160
D210	IN4007				300524990
D211	IN4007				300524990
D212	WR057				300525770
D213	WR057				300525770
D214	Zener 6.8V				300522540
D215	Zener 3.3V				300521860
D216	Zener 3.3V				300521860
D217	SD3				300522160
D218	SD3				300522160

Cct Ref	General Description	Solartron Part No.
D219 to D222	BAY 72	300524530
D224	IN4933	300524830
D225	SD3	300522160
SK201	Socket 16-way	300584900
SK202	Socket 4mm red	352501470
SK203	Socket 4mm blue	352501710
SK204	Socket 4mm black	352501480
SK205	Rendar R32400000	352502080
RLA RLB RLD RLJ RLK	Relay	301203201
RLC	Relay DIP 5V	300652090
RLL	Relay Reed 20W	300652030
RLE RLF RLG RLH RLN RLP RLR	Relay121A-4	300652100
T201	Transformer RM10	309615801
FS201	Fuse Clip	360208110
TP2 to TP5	Test Point	355400760

72010503 PCB 3

Cct Ref	General Description				Solartron Part No.
R301 to R307	CACP	3.3k	1/4W	10%	172033300
C301	CERM	470n	12V	+50% -25%	241744700
C302	CERM	470n	12V	+50% -25%	241744700

72010503 PCB 3

Cct Ref	General Description	Solartron Part No.
IC301	M7218A	510004870
IC302	M7218A	510004970
IC303	74LS05	510002900
IC304	74LS05	510002900
IC305	CD4022BE	510004960
D301 to D306	MAN 6610	300730320
D307 to D309	MAN 72	300730330
D310	MV 5024	300750060
D311	MV 5024	300750060
SK301	Socket 16-way DIL	300584900
SK302	Socket 16-way DIL	300584900
SK304 to SK306	Socket 40-way DIL	300584971
SK307 to SK309	Socket 14-way DIL	300584680
PL301	Plug Berg	352336050
X301	Bleeper ITT	300950040

72010504 PCB 4

Cct Ref	General Description				Solartron Part No.
R404	CACP	150	1/4W	10%	172021500
R406	CACP	150	1/4W	10%	172021500
R411	MEFM	10k	1/8W	0.5%	192741002
R412	CACP	680	1/4W	10%	172026800
R413	CACP	10	1/4W	10%	172011000
R414	MEFM	10k	1/8W	0.5%	192741002
R415	CACP	10k	1/4W	10%	172041000
R416	MEFM	270k	1/8W	0.5%	192752701

Cct Ref	General Description				Solartron Part No.
R417	CACP	15k	1/4W	10%	172041500
R418	CACP	100k	1/4W	10%	172051000
R419	MEFM	2.7k	1/8W	0.5%	192732702
R420	MEFM	9.1k	1/8W	0.5%	192739102
R421	CACP	100k	1/4W	10%	172051000
R422	CACP	1k	1/4W	10%	172031000
R424	CACP	3.3M	1/4W	10%	172063300
R428	CACP	10k	1/4W	10%	172041000
R429	CACP	56	1/4W	10%	172015600
R430	MEFM	2.7k	1/8W	0.5%	192732702
R431	CACP	47k	1/4W	10%	172044700
R434	CACP	100k	1/4W	10%	172051000
R435	CACP	1k	1/4W	10%	172031000
R436	CACP	3.3M	1/4W	10%	172063300
R437	MEFM	180k	1/8W	0.5%	192751802
R438	MEFM	10k	1/8W	0.5%	192741002
R439	CACP	10k	1/4W	10%	172041000
R440	CACP	10	1/4W	10%	172011000
R441	MEFM	1.8k	1/8W	0.5%	192731802
R442	MEFM	47k	1/8W	0.5%	192744702
R443	CACP	680	1/4W	10%	172026800
R444	CACP	680	1/4W	10%	172026800
R445	CACP	220	1/4W	10%	172022200
R446	CACP	220	1/4W	10%	172022200
RV401	CMPM	1k	1/2W	10%	130931000
C412	CERM	3.3n	500V	25%	241333300
C413	CERM	47n		50% -25%	241944700
C414	ESTF	4.7n	100V	±10%	227034700
C415	CERM	47n		50% -25%	241944700
C416	CERM	100p	500V	20%	241321000
C417	ALME	22	40V		273772200
C418	CERM	47n		50% -25%	241944700
C419	ESTF	4.7n	100V	±10%	227034700

72010504 PCB 4

Cct Ref	General Description				Solartron Part No.
C420	CERM	47n		+50% -25%	241944700
C421	CERM	100p	500V	+20%	241321000
C423	CERM	47n		+50% -25%	241944700
C424	CERM	3.3n	500V	25%	241333300
C425	CERM	3.3n	500V	25%	241333300
TR402	BD518				300555260
TR404	BD518				300555260
IC401	TL494CN				510090690
IC402	TL494CN				510090690
IC403	Voltage Regulator				510090450
D409	SD3				300522160
D411	Zener5.6V				300521450
D413	Zener5.6V				300521450
D414	Zener2.7V				300523870
D415	Zener2.7V				300523870
L403	Inductor Choke				305020440
L404	Inductor Choke				305020440

72010505 PCB 5

Cct Ref	General Description				Solartron Part No.
R501	CACP	47k	1/2W	10%	172344700
R502	CACP	100	1/4W	10%	172021000
R503	CACP	100k	1/4W	10%	172051000
R504	MEOX	680	1/4W	1%	195326800
R505	MEOX	180	1/4W	1%	195321800
R506	MEOX	180	1/4W	1%	195321800
R507	MEOX	330	1/4W	1%	195323300
R508	CACP	2.7k	1/4W	10%	172032700
R509	CACP	2.7k	1/4W	10%	172032700
C501	CERM	100p	200V	10%	208400069
C502	CERM	100p	200V	10%	208400069
C503 to C507	CERM	10		+50% -25%	241941000
TR501	U235				300553810

72010505 PCB 5

Cct Ref	General Description				Solartron Part No.
IC501	MC 1650L				510090750
D501	SD3				300522160
D502	LED				300750140
PL503	Post Header 36-way				352336070
Logic Probe Tip					355901380

72010506 PCB 6

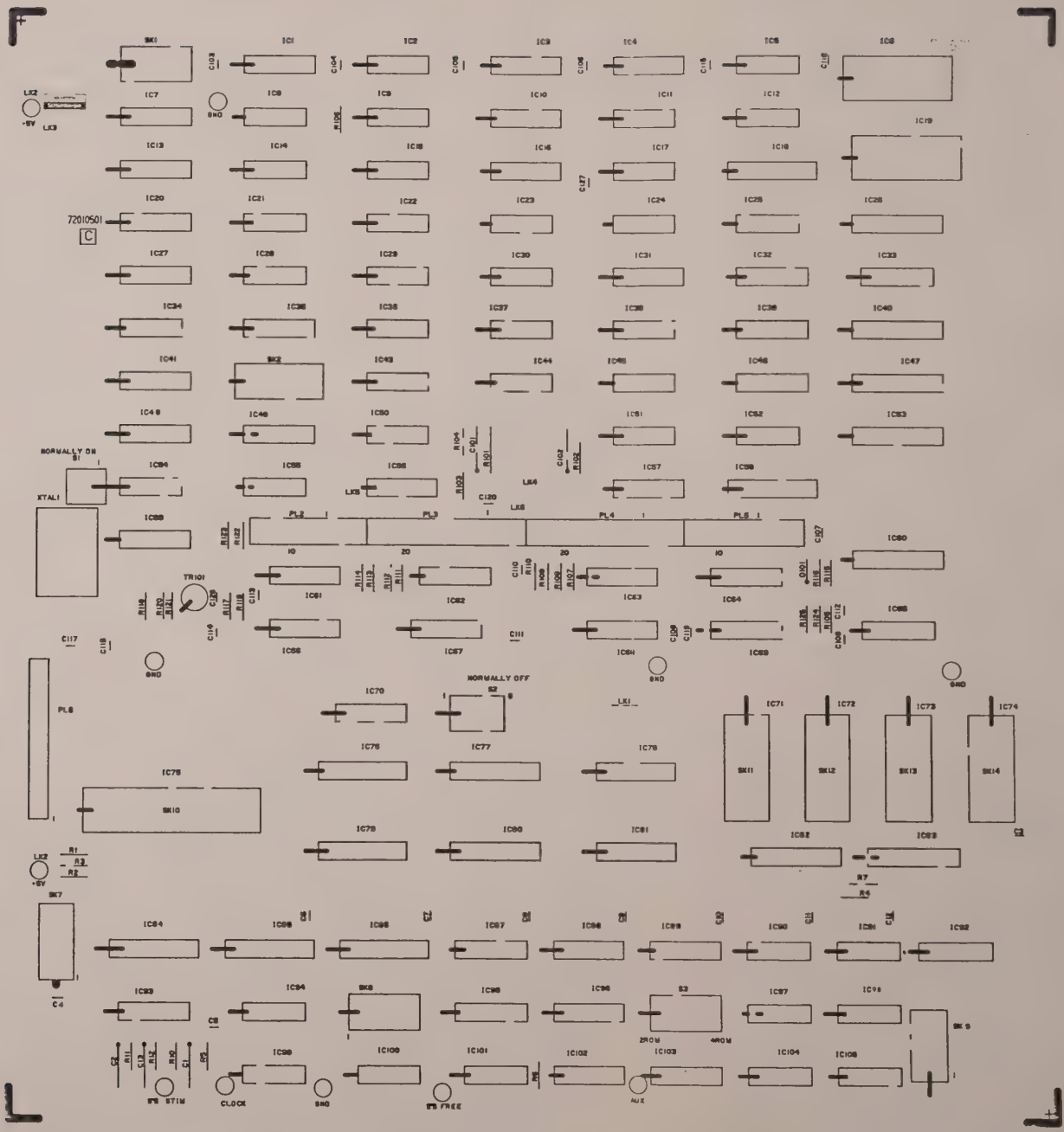
Cct Ref	General Description				Solartron Part No.
R601 to R603	CACP	47k	1/4W	10%	172044700
R604 to R606	CACP	33k	1/4W	10%	172043300
R607	CACP	1k	1/4W	10%	172031000
R608	MEFM	470	1/8W	0.5%	192724702
R609	MEFM	180	1/8W	0.5%	192721802
R610 to R612	CACP	120	1/4W	10%	172021200
R613	CACP	1k	1/4W	10%	172031000
C601 to C606	CERM	47n	12V	+50% -25%	241744700
C609 to C611	CERM	47p	500V	20%	241314700
IC601	MC1650L				510090750
IC602	MC1650L				510090750
IC604	74LS138				510003530
IC605	Resistor Network	8 x 10k	1.5W	2%	192141000

72010507 PCB 7

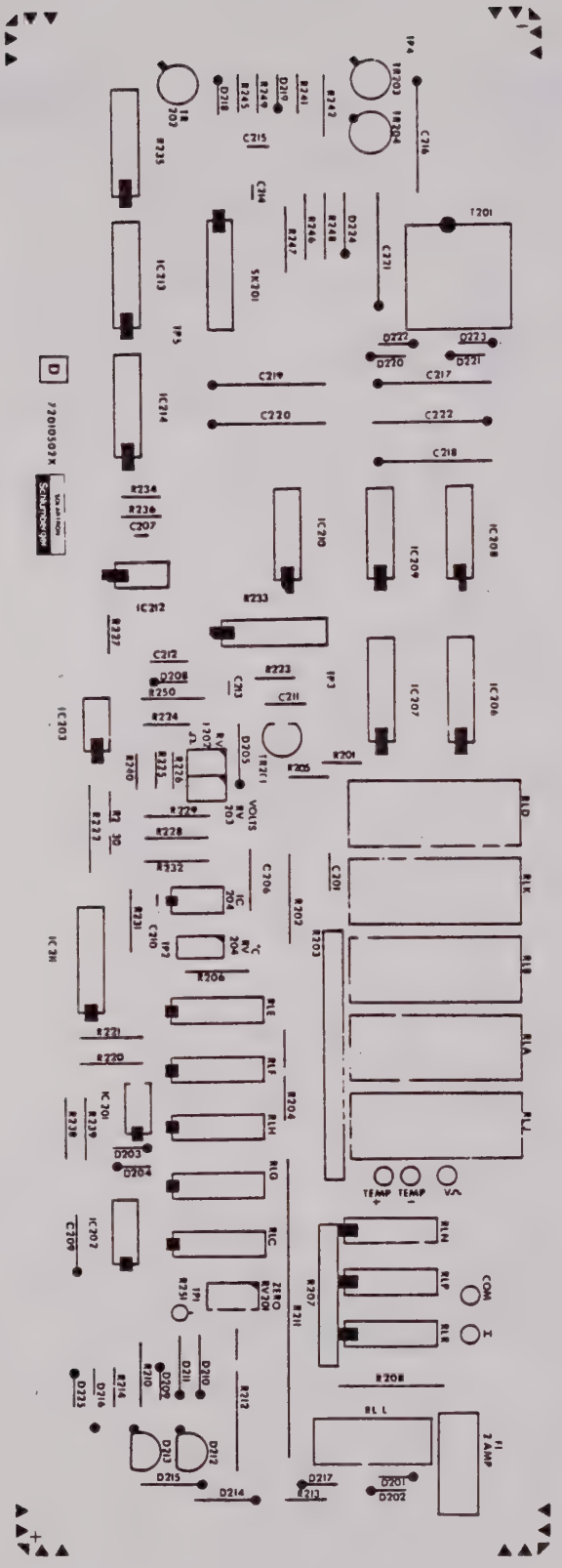
Cct Ref	General Description				Solartron Part No.
R701	MEFM	470k	.125W	0.5%	192754702
RV701	CMPS	1M	.5W	20%	131261000
IC701	AD590KH				510090760

72010509 PCB 9

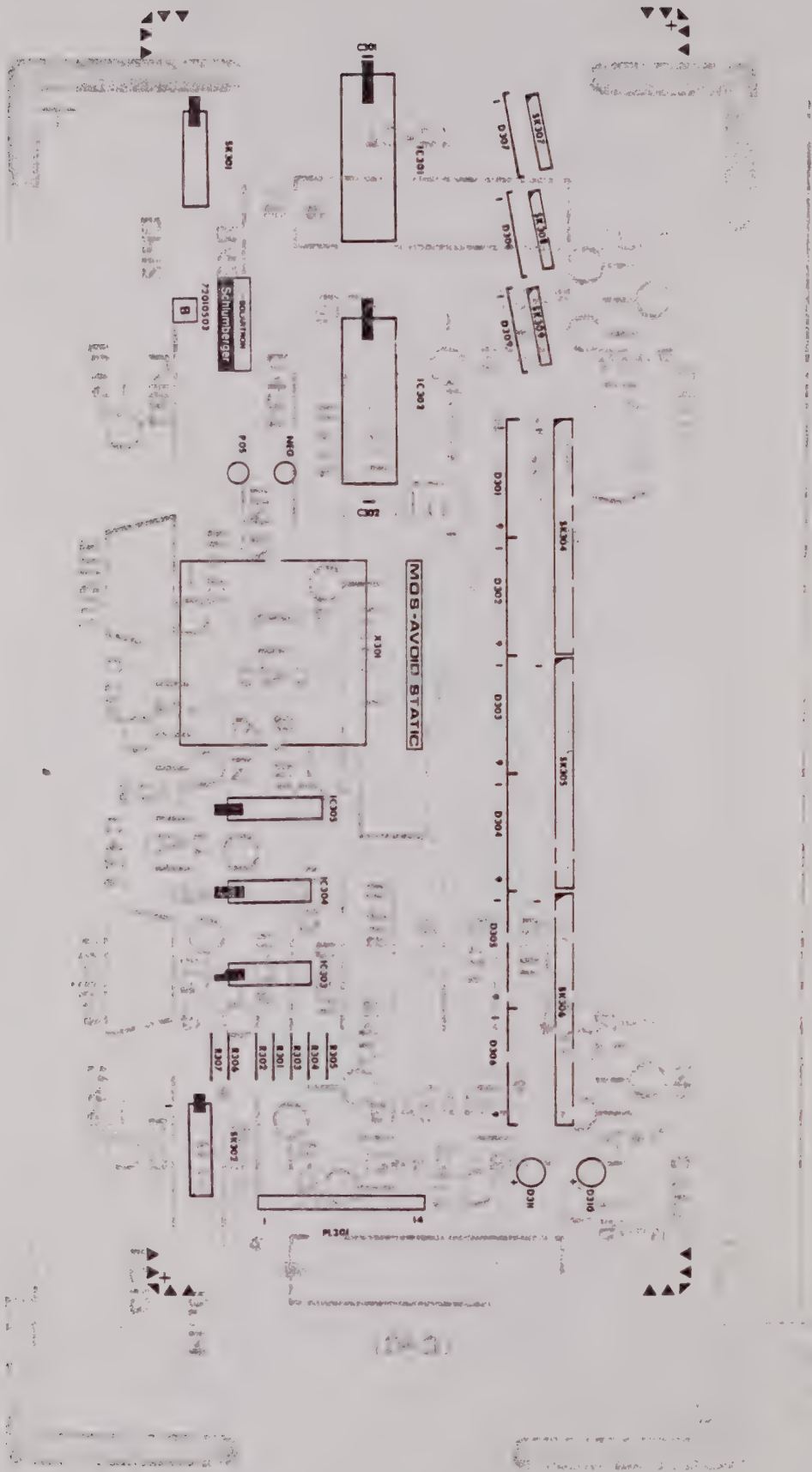
Cct Ref	General Description				Solartron Part No.
R409	PRWW	0.1	1.5W	10%	160200088
R410	PRWW	0.03	1.5W	10%	160200089
C401	CERM	10n		+50% -25%	241941000
C402	CERM	10n		+50% -25%	241941000
C427 to C434	TAND	220	10V	20%	265482200
SCR401	2N4441				300524660
SCR402	2N4441				300524660
SK401	Socket 16 pin DIL				300584900



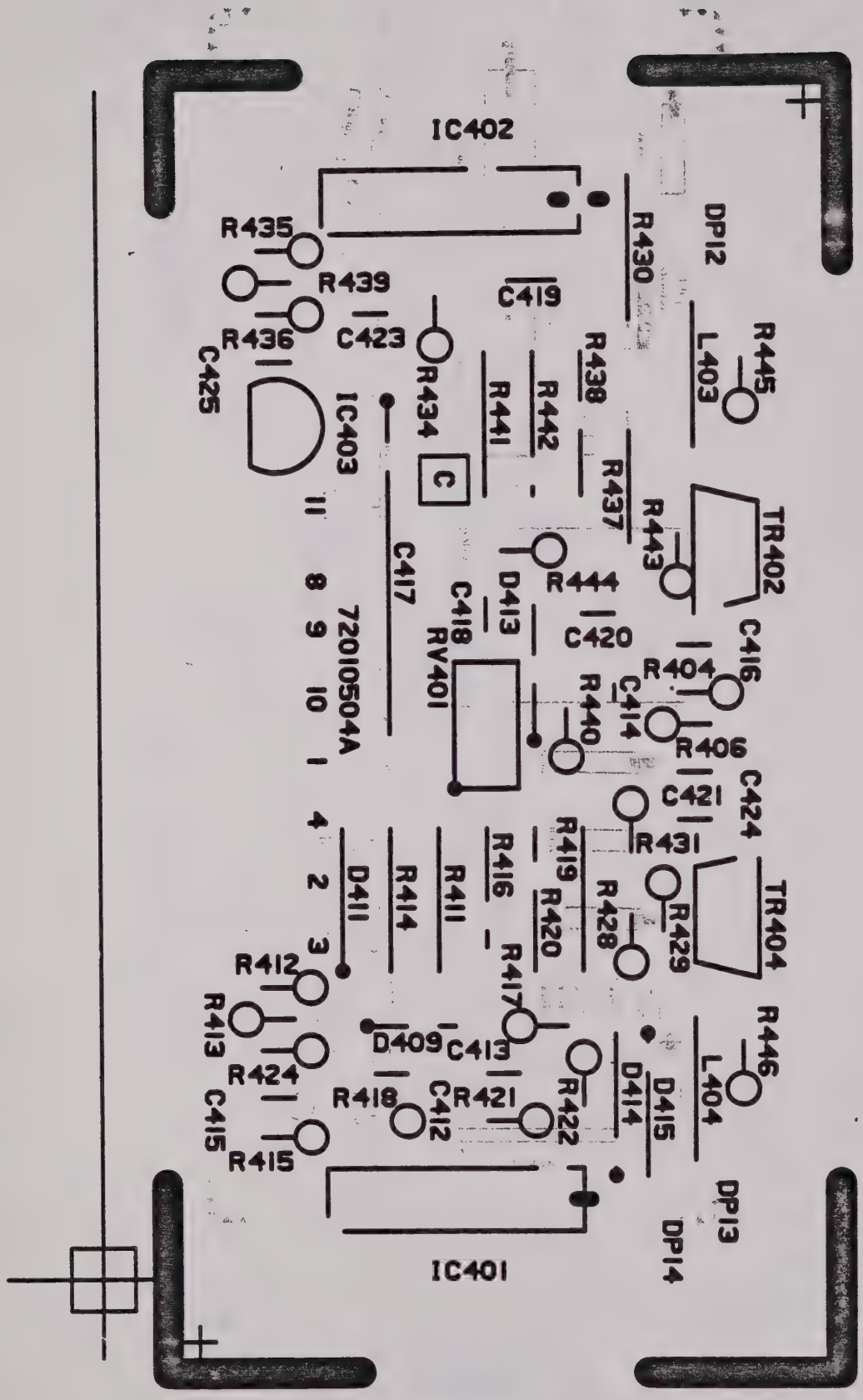
PCB 1 Notation Diagram 5.15



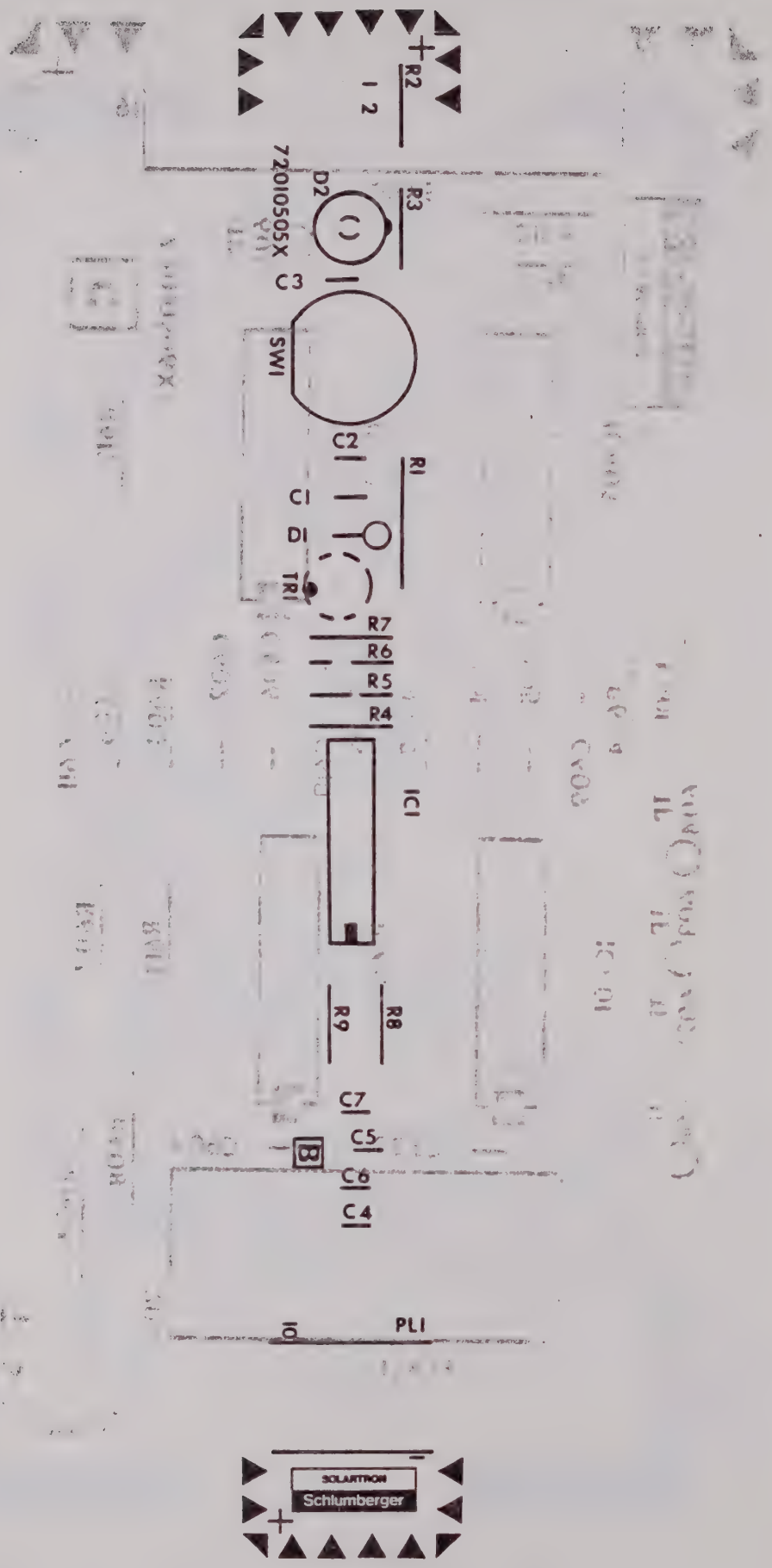
5.17 PCB 2 Notation Diagram



PCB 3 Notation Diagram



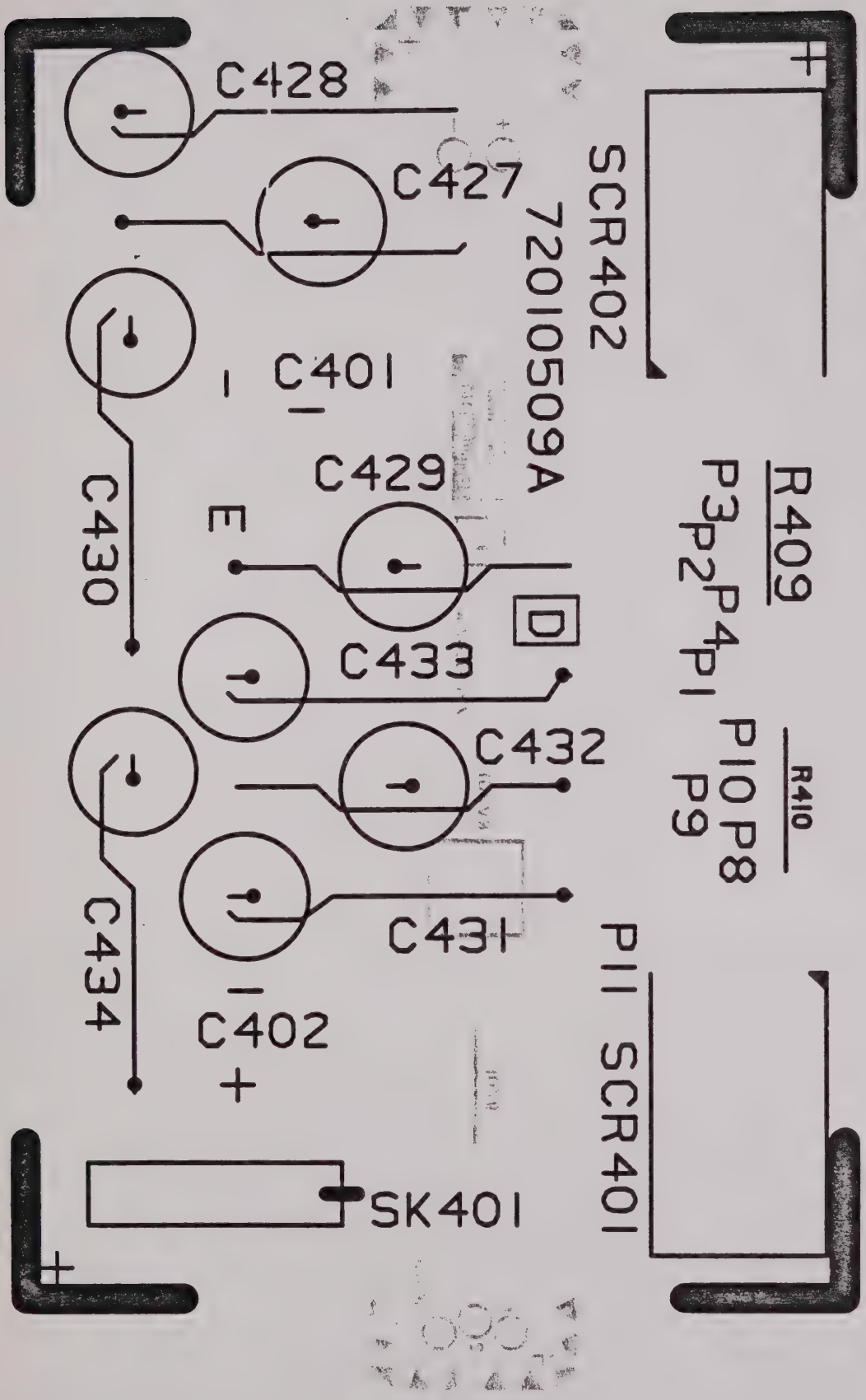
PCB 4 Notation Diagram



PCB 5 Notation Diagram

PCB 6 Notation Diagram

PCB 7 Notation Diagram



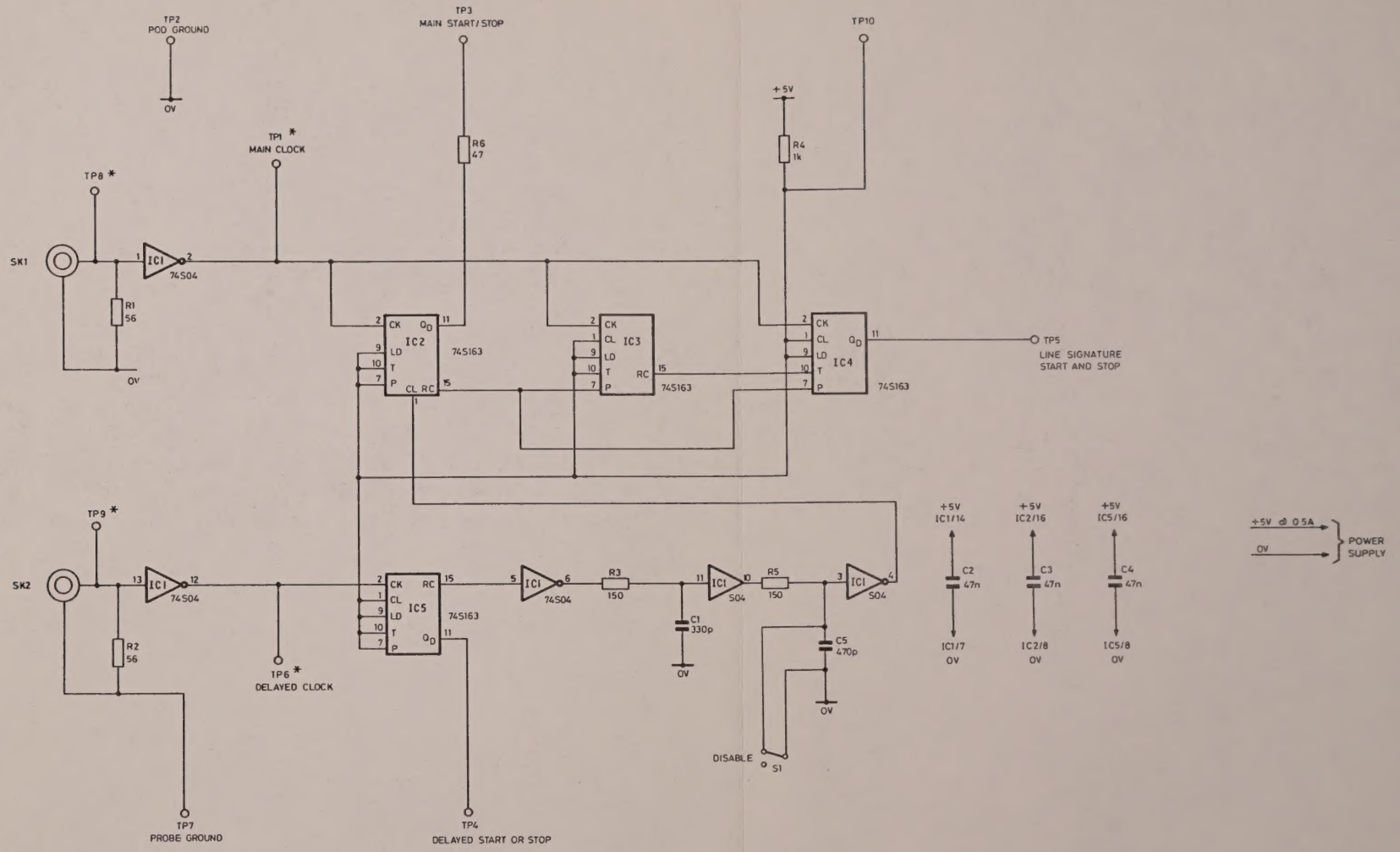
PCB 9 Notation Diagram

APPENDIX 1
SPECIAL TEST EQUIPMENT

		General Description		Solution Part No.

PARTS LIST OF 7201 DELAY TEST BOX

Cct Ref	General Description				Solartron Part No.
R1	CACP	56	1/2W	10%	172315600
R2	CACP	56	1/2W	10%	172315600
R3	CACP	150	1/2W	10%	172321500
R4	CACP	1k	1/2W	10%	172331000
R5	CACP	150	1/2W	10%	172321500
R6	CACP	47	1/2W	10%	172314700
C1	CERM	330p	500V	10%	208450060
C2 to C4	CERM	47n	12V	+50% -25%	241744700
C5	CERM	470p	500V	20%	241324700
IC1	SN74S04N				510002660
IC2 to IC5	SN74S163AN				510004260
SK1	Socket BNC 50Ω Fixed				352101030
SK2	Socket BNC 50Ω Fixed				352101030
TP1 to TP10	Test Points				



NOTE: TEST POINTS 1,6,8,9
ASSOCIATED WIRING TO BE
AS SHORT AS POSSIBLE (< 2 INS.)

Delay Test Box A3

MP MASTER
MA24031

SOLARTRON
Schlumberger

THE SOLARTRON ELECTRONIC GROUP LIMITED
FARNBOROUGH HAMPSHIRE ENGLAND GU14 7PW TEL. FARNBOROUGH 44433 (STD 0252)
CABLES: SOLARTRON FARNBOROUGH HANTS. TELEX: 858245 SOLARTRON FARNBOROUGH